

Workplace wellbeing programmes and their impact on employees and their employing organisations: A scoping review of the evidence base

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Workplace wellbeing programmes and their impact on employees and their employing organisations: A scoping review of the evidence base

A collaboration between Health Exchange & University of Birmingham

Fenton, S-J., Pinilla Roncancio, M., Sing, M., Sadhra, S. & Carmichael, F.

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ABSTRACT: This report constitutes a scoping literature review that identifies and critically examines the evidence base surrounding health and wellbeing programmes conducted in the workplace and their impact on employees and their employing organisations. The review drew on a broad range of sources covering multiple sectors. However, the report additionally highlights evidence that relates specifically to the retail and construction industries. The review offers an analysis of the current evidence base and discusses the implications of implementing different types of workplace health and wellbeing schemes. Some recommendations for supporting and promoting the health and wellbeing of employees in organisations are made on the basis of this review and, where gaps in knowledge are identified, recommendations for further research are made.

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1. Introduction

This scoping literature review identifies and critically examines the existing evidence base surrounding the effects of workplace health and wellbeing programmes on employees and their employing organisations. According to the Chartered Institute of Personnel and Development (CIPD, 2007:5) such initiatives “need to balance the needs of the employee with those of the organisation” and in line with this defines wellbeing at work as:

“creating and environment to promote a state of contentment which allows an employee to flourish and achieve their full potential for the benefit of themselves and their organisation”
(CIPD, 2007:5)

The review drew on a broad range of sources and synthesises evidence relating to multiple sectors. However, a specific objective of the review was to collate and report on evidence relating specifically to workplaces in retail and construction and therefore where such evidence is available it is highlighted. This approach is in line with the defining characteristics of scoping studies which tend to address broader topics and questions and incorporate a wider range of research designs than systematic reviews (Arksey and Malley, 2005). As such, the primary purpose of the review was to summarise the ‘extent, range and nature’ of research evidence on workplace health and wellbeing interventions.

1.1 The importance of workplace wellbeing and health in the workplace

Consideration of workplace wellbeing and health in the workplace is an increasing preoccupation for organisations. This preoccupation is mainly attributable to the positive links that have been found between the health and wellbeing of employees and productivity and performance. Because of this relationship there are incentives for employers to intervene to support and promote the health and wellbeing of their employees. Depending on the intervention, there is potential for the gains from intervening to outweigh the costs of not intervening. In addition to raising productivity, interventions to support health promotion in the workplace can reduce the cost of health care for employees which is particularly important in countries such as the US where health insurance is paid directly by employers. Such interventions can also be part of a strategy to respond to duties and regulations around responsible employment. However, the most cited rationale for intervention in the workplace is to improve the quality of life and productivity of workers and to reduce economic losses through absence, sickness, disability and presenteeism:

“Today many employers associate poor health with reduced employee performance, safety and morale. The organisational costs of workers in poor health, and those with behavioural risk factors, include high medical, disability, and workers; compensation expenses; elevated absenteeism and employee turnover; and decreased productivity

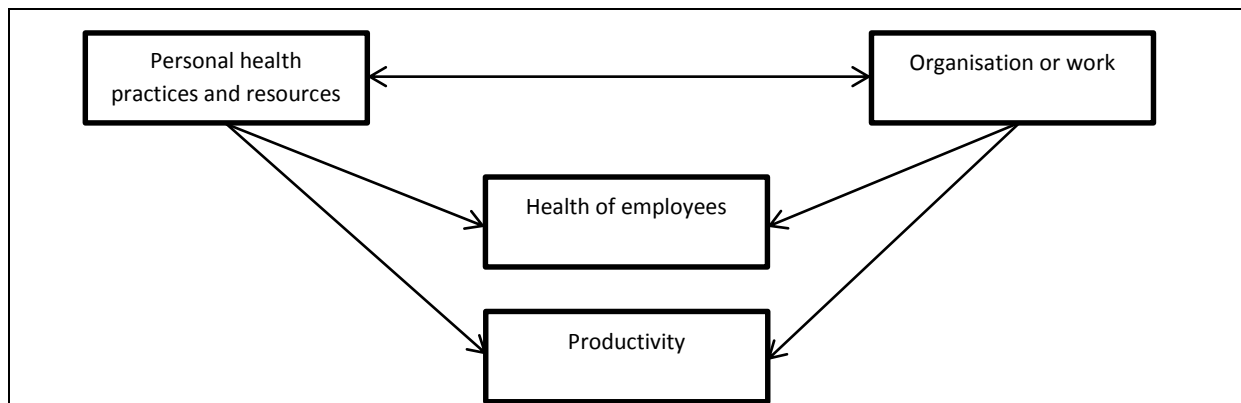
at work (often referred to as presenteeism). In addition, one worker's poor health may negatively affect the performance of others who work with him or her" (Goetzel and Ozminkowski, 2006: 305).

According to Shain and Kramer (2004) health in the workplace and indirectly productivity is affected by:

- (i) Things that employees bring with them to the workplace: Personal resources, health practices, beliefs, attitudes, values and hereditary endowments
- (ii) What the workplace does to and for employees once they are there: the organisation of work in both the physical and psychosocial sense and how this impacts on the interaction between the physical environment and the psychosocial environment (e.g. work culture and climate).

The combination of these factors leads to the relationship between health, wellbeing and productivity illustrated in Figure 1.

Figure 1: The relationship between workplace health and productivity



Source: Shain and Kramer (2004: 644)

This review focuses broadly on the literature and available evidence that relates to the relationship in (ii) and the right hand side of Figure 1. Specifically, what workplace health and wellbeing interventions do to and for employees. In this review, an 'intervention' describes a policy or process/system put in place by employers that aims to improve health and wellbeing of individual at work. In this context the review explores workplace wellbeing and health interventions in three main areas. These areas were selected because they are the areas in which most interventions take place and they are also the main foci of research activity. The three areas are: (1) mental health promotion and support for mental illness; (2) health promotion through physical activity and nutrition programs and programmes aiming to reducing smoking prevalence and; (3) programs concerned with improving occupational health and safety in the workplace and tackling specific occupational health issues e.g. musculoskeletal disorders. .

1.2 Types and levels of intervention in workplace health and wellbeing interventions

A working definition of mental wellbeing used by NICE (2009:4) citing the Foresight Mental Capital and Wellbeing Project (2008:10) is that: "Mental wellbeing is a dynamic state in which the individual is able to develop their potential, work productively and creatively, build strong and positive relationships with others and contribute to their community. It is enhanced when an individual is able to fulfil their personal and social goals and achieve a sense of purpose in society" This definition

captures the eudemonic (purpose driven) approach to wellbeing and implies a strong link between wellbeing, its antonym ill-being and both mental and physical health. In line with this definition, interventions focussed on wellbeing are often synonymous with mental and physical health. Examples of the kinds of interventions that have been implemented to promote health and wellbeing include: counselling for issues such as alcohol, drugs, or other personal, behavioural or family problems; educational or behavioural interventions directed to stress management; fitness; health information and assistance. In contrast, hedonic (pleasure driven) approaches to wellbeing focus more on “the type of affective feelings that a person experiences (e.g. anxiety or contentment) and also on the adequacy of those feelings (e.g. whether the person is satisfied with certain aspect of their life)” (Bryson et al, 2014:12). While there are clearly differences between the eudemonic and hedonic approaches, there are also some points of convergence as evidenced by Faragher et al. (2005: 105) who find that “job satisfaction level is an important factor influencing the health of workers”.

Three main categories of health intervention have been proposed by the World Health Organization (WHO) and these are commonly used in the design and implementation of: primary health care, disease prevention and health promotion programmes. Primary health care incorporates all relevant sectors that are involved in addressing the main health problems in a specific community. The second category of health intervention relates to disease prevention, which can be operationalised at three levels (WHO, 2002): primary (prevention); secondary (addressing the severity of illness) and; tertiary (addressing the associated disability or incapacity). Figure 2 gives some examples of targets and interventions at these levels. Tertiary intervention for instance aims to reduce the incapacity associated with an illness and includes activities such as therapy, rehabilitation and return to work, education and social life (Tammy Boyce et al., 2010). Finally, the WHO has defined health promotion as the process of enabling individuals to “increase control over, and to improve, their health” and state that “To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment” (World Health Organization (WHO), 2009, p. 2).

Figure 2: Primary, secondary and tertiary targets and interventions for workplace health

Layer	Target	Examples of interventions
Primary	Employed populations that are generally healthy.	Programs that encourage exercise and fitness; healthy eating; weight management; stress management; use of safety belts in cars; moderate alcohol consumption; recommended adult immunizations; and safe sex.
Secondary	Individuals already at high risk because of certain lifestyle practices (e.g. smoking, being sedentary, having poor nutrition, practicing unsafe sex, consuming excessive amounts of alcohol, and experiencing high stress) or abnormal biometric values (e.g. high blood glucose, over-weight).	Hypertension screenings and management programs; smoking cessation telephone quit lines; weight loss classes; and reduction or elimination of financial barriers to obtaining prescribed lipid-lowering medications.
Tertiary	Disease management of individuals with existing ailments e.g. diabetes, cardiovascular disease, cancer, musculoskeletal disorders, depression.	Return to work interventions; specialist targeted services within the workplace.

Source: Goetzel and Ozminkowski, 2006: 304.

Most interventions implemented in the workplace adopt a primary or secondary disease prevention approach that aims to reduce health risks. Primary prevention aims to implement interventions, where the main objective is to improve the health status of the whole population, regardless of individual risks. Secondary and tertiary prevention interventions work with exposed individuals in

order to reduce or reverse the negative consequences of a disease, in a worksite; secondary interventions reduce return-to-work time (Proper and van Mechelen, 2008).

Examples of interventions that have been claimed to improve employee health and increase workplace wellbeing include: gym access and fitness at work, stress management, smoking cessation, back care, weight reduction/nutrition programs and medication for chronic conditions. However, while there is ever increasing list of types of interventions that workplaces are implementing, little is known about the effectiveness of these interventions. This literature review summarises available evidence relating to the effectiveness of such interventions with a specific focus on the construction and retail sectors.

1.3 The policy context in the UK

Where the responsibility for workplace health and wellbeing lies is contested. In the UK, Occupational Health and Safety regulations have taken a central role in employment and in the designation of employer responsibilities for many years. However, interest in how a proactive approach to mental health and wellbeing in the workplace could benefit employers as well as employees (alongside standard practices concerned with the management of risk) is of more recent genesis and is growing in importance. The Disability Discrimination Act (1995) and more particularly the Equality Act (2010) have explicitly articulated the rights of persons with mental illness in relation to employment. Central to these Acts is the requirement for employers to make appropriate workplace adjustments and provide suitable support for individuals with health conditions. In 2017, a new series of NICE guidelines will be published looking at how employers can promote mental wellbeing at work (NICE, Exp. 2017); and in May 2015, the NICE report “Workplace policy and management practices to improve the health and wellbeing of employees” is due to be published. This looks at the employer’s role in and responsibility for the promotion of mental health and wellbeing in the workplace (NICE, Exp. 2015). Employers will need to ensure that their organisation policies reflect the importance and benefits of wellbeing for both the employer and employee and support employees with health problems.

In line with these publications, there is an increasing emphasis on employers engaging with and supporting workplace wellbeing with the objectives of increasing productivity; decreasing health care costs; increasing return to work rates; decreasing disability and unemployment for health related reasons; and prevention of illness. This literature review is therefore timely and relevant in relation to the socio-political context for businesses and organisations operating within the UK at the moment.

1.4 The format of the review

The review offers an analysis of the current evidence base relating to workplace health and wellbeing interventions. The first part of the review considers mental health, occupational stress, and workplace wellbeing by examining the existing evidence for interventions in these areas. This section also considers related health promotion strategies and the particular challenges posed for the retail and construction sectors in this area. The second part of the review considers interventions focussed on physical health promotion. This section examines the evidence base around programmes focussed on nutrition, physical activity and smoking cessation in the workplace and additionally highlights research evidence from the construction industry. The third part of the review

examines evidence relating to interventions concerned with physical health and health and safety in the workplace. Evidence relating to the construction sector is highlighted.

The last part of the review summarises the evidence on the implementation of workplace health and wellbeing programmes, suggests steps that can be taken within an organisational context to mutually support employees and benefit employers and makes recommendations for future avenues of research



2. Methodology

2.1 Objectives and search strategy

The main objective of this study was to review the available evidence on the effectiveness of interventions implemented in the worksite in relation to (1) mental health and stress; (2) nutrition, physical activity and smoking and; (3) musculoskeletal disorders and health and safety.

In order to fulfil this objective, an extensive literature review search was conducted using three main inclusion criteria: (i) the published or released date should be between 2000 and 2014 (inclusive); (ii) a detailed description of the type of intervention(s) conducted, measures and results of intervention(s) should be included in the study and (iii) systematic reviews that evaluated the available evidence were also included.

The search was defined using a three-tiered approach to identification using the following sets of keywords: (i) workplace/occupational or health and well-being/health promotion or interventions/programmes/policies; (ii) healthier eating/nutrition/physical activity exercise/walking/smoking or musculoskeletal disorder/ health safety or stress/mental health/psychological ill health and (iii) construction/retail (see Appendix 1 for details of the main search terms used). The following databases were used in this search: Cochrane Library, PubMed, EMBASE, MEDLINE, ASSIA, the Social Sciences Citation Index, PsychINFO, Findit@bham and Google Scholar.

The selection of the documents was undertaken in two stages. First, documents were selected by title and abstract; second, documents that discussed interventions in the workplace and aimed to improve mental health, nutrition, physical activity, smoking cessation, musculoskeletal disorders and health and safety were read in detail. All documents included were classified according to: type of intervention, effectiveness, population included (type of workers) and country where the study was implemented.

The number of studies conducted in the United Kingdom (UK) or in the retail or the construction sectors was quite low and therefore neither was used as a criteria of selection. However, studies in the UK and studies conducted in either construction or retail where available are discussed in detail in the report.

2.1 Specific search criteria

For each of the three main areas of the analysis, a specific search was implemented. In the case of mental health, occupational stress and workplace wellbeing search terms including 'mental health' and 'wellbeing' were used. In this area, it was not feasible to limit the search to studies published after 2000, because some key documents were published before this date. Articles detailing any type or level of intervention were sought and to facilitate the exploration of the construction and retail industries these were included within search terms. Once the search terms had located a range of articles, the abstracts were read in detail to check whether the research resonated with the current review. On this basis, twenty eight items were selected for inclusion within the review. The articles were then classified according to: whether there was evidence to support the intervention; the specific intervention and if it had been found to be effective; specific evidence for the retail and construction industries.

The search conducted to identify interventions in health promotion through activities linked to nutrition, physical activity and smoking cessation followed similar steps. In a first stage, only systematic reviews, meta-analyses and articles conducted in the UK or including construction or retail workers were selected. Given that the number of interventions satisfying these criteria was

small, the systematic reviews were used to locate other studies. For each included article, where available, a detailed description of the intervention(s), population, measures and outcomes was incorporated into the analysis. All articles were classified depending on: type of intervention, type of health targeted, industry, country and effectiveness of interventions. Finally, the information was classified using four main categories: 1) Interventions aiming to improve nutrition or eating behaviours; 2) interventions aiming to increase physical activity; 3) interventions aimed at smoking cessation and 4) multicomponent interventions (including strategies to improve eating behaviours; physical activity and smoke cessation). At the end of the review 15 systematic reviews, 3 meta-analysis and 35 articles were included into the analysis.

Finally, databases were searched using the terms musculoskeletal disease/injury/pain (MSD) and health and safety/injury or death along with the more general terms listed in the general search section (as above and Appendix 1). The search yielded 13 documents of interest in relation to MSD prevention or return-to-work following injury of which: 1 concerned the UK and 3 focussed on the construction sector. None of the papers located focussed specifically on the retail sector. 11 documents reporting health and safety (safety/injury or death) related practices were located of which only 1 was concerned with the UK but the majority of the articles reviewed focussed on the construction sector. No publications explicitly focussed on the retail sector were located.

Figure 3 summarises the types of articles and documents included in this review. The documents are divided into the three main areas (i) mental health/ workplace wellbeing; (ii) health promotion through nutrition, physical activity and smoking cessation and; (iii) musculoskeletal disorders and health and safety.

Figure 2: Table depicting articles scoped and included in this review

	Mental Health and Workplace Wellbeing	Health promotion: Nutrition, physical activity and smoking cessation	Musculoskeletal disorders (MSD) and health & safety	Total
Systematic Reviews	1	15	4	20
Meta-analyses	2	3	-	5
Academic articles	23	35	11	69
Grey literature	1	-	-	1
Unpublished	-	-	2	2
Other	1	1	6	4
Total	28	54	23	

3. Mental Health, Work-related Stress, and Workplace Wellbeing

3.1 Introduction

Health and wellbeing promotion has been integral to international workplace culture in western developed countries such as the UK and Australia since the early 1980's (Chu et al., 1997; Kirk and Brown, 2003). However, the related language and discourse has changed over time and varies internationally to incorporate concepts such as institutional stress and programs which support positive mental health in the workplace either at the individual or the organisational level (e.g. Employee Assistance Programs or EAP's and Health Promotion Programs or HPP's in the USA, Australia and Canada). For the purpose of this review, the literature was broadly searched using the term 'workplace wellbeing', which incorporates health promotion in relation to mental health and the wider structure of interventions that are intended to have positive effects for wellbeing.

Despite many interventions over the past thirty years it is somewhat surprising to find that there has been rather limited research concerned with discovering which interventions in this area are the most effective in workplace settings. However, from early research into stressors and strains in occupational health, there is a growing awareness that interventions need to target both individuals, and the organisational environment (Cotton and Hart, 2003; Stansfeld and Candy, 2006).

3.2 Evidence supporting workplace wellbeing intervention

Poor mental health and illness is one of the leading causes of disability both in the UK and internationally. An evidence base is building that supports the link between the incidence of depression and anxiety or poor mental health and low job quality and work stress (Dewa and McDaid, 2011; Sanderson and Andrews, 2006; Stansfeld and Candy, 2006). As LaMontagne *et al.* state, "job stress and other work-related psychosocial hazards are emerging as the leading contributors to the burden of occupational disease and injury" (LaMontagne, et al., 2007: 221). In the UK, there are legal frameworks (such as the *Disability Discrimination Act*, 1995 and the *Equality Act*, 2010) that articulate the responsibility employers have both to support people with mental illness, but also, importantly to maintain a healthy workplace and in so far as is proportionate, maintain workplace wellbeing. This section of the review focuses on the literature relating to mental health and wellbeing, explores the evidence to support businesses taking responsibility for these areas, and considers the effectiveness of specific interventions. The review highlights the limited available evidence from the retail and construction industries. The evidence was drawn from 28 identified sources.

The evidence to support the need to intervene in to support those with mental health disorders , and to encourage workplace wellbeing through health promotion initiatives is growing, with multiple reasons cited for intervention including human rights and justice issues, economic arguments, spillover effects and health insurance considerations (see Figure 4) and Table A2.2 in Appendix 2 for evidence sources).

Figure 3: Reasons for health promotion plans to be delivered within workplace settings

- ✧ Organisational infrastructure reduces cost and makes it easier to develop and co-ordinate programs
- ✧ Having a large 'captive' population or easily accessible target group
- ✧ Health gap and inequality between 'blue collar' and 'white collar' workers
- ✧ Human rights and justice issues including the need to address workplace wellbeing if: (1) mental disorders decrease the proportion of the population who are not in the labour force, (2) mental disorders decrease the employment opportunities for people who would like to work, or (3) mental disorders affect the ability of workers to do their jobs (Dewa and McDaid, 2011: 35)
- ✧ Economic arguments including decreased productivity or work performance; reduction of persons in the labour force through absenteeism or unemployment or early retirement; elevated indirect costs through sickness and disability
- ✧ Compensable disorders/lawsuits or risk and safety issues
- ✧ Increased employee morale/job satisfaction/better corporate image
- ✧ Increased vulnerability to mental health problems without support
- ✧ Spillover effects on co-workers and supervisors and/or families
- ✧ Insurance and health related direct costs to employers (US; Canada – this is often related to the structure of the health care system)

In the UK, since the 2008 Black report and related debates concerned with the economic impact of mental and emotional health problems, government has committed to the development of a national mental health and employment strategy (Dewa and McDaid, 2011). This pattern is observable in other countries, where often it is the business sector forming consortiums (as in Canada) to consider developing strategies to “curb disability costs” to organisations (Dewa and McDaid, 2011: 34). Dewa and McDaid (2011) reviewed evidence from a range of studies including studies on depression and argue that gender effects the relationship between work stress and poor mental health, as men who have depression indicate high job strain as a factor whilst women who have depression identify low social support in the workplace. Mental health concerns in the workplace are complex and further research is needed both to look at different work contexts, but also the diversity issues within and around those contexts.

The relationship between workplace wellbeing and stress is also far from straightforward. The work of Cotton and Hart (2003) in particular has implications for the management of occupational stress. Cotton and Hart state that “research has shown that it is a person’s level of energy, enthusiasm and pride that more strongly influences their decision to take time off work, rather than the level of distress they may be experiencing” (Cotton and Hart, 2003: 120). Their work looking at police officers and teachers, found that organisational factors were hugely influential, more so that adverse employment experiences, which challenges the conventional wisdom that significant events are the main stressors (Cotton and Hart, 2003). These research findings are important for understanding the factors that significantly impact on wellbeing. The implication is that organisational and management changes should be targeted rather than individual distress since morale within an organisation is an important protective factor. However, there is no discussion of sector-wide influences such as wider issues of morale in a professional workforce. This could be an interesting area for future research particularly in the light of recent policy interventions in the public sector.

Faragher *et al.* (2005) conducted a meta-analysis of 485 studies with a research sample of 267,995 individuals, and found that job satisfaction levels are linked to the health of workers (Faragher *et*

al., 2005: 105). However, they also found that “if reviewed superficially, the evidence can easily appear to be both contradictory and inconclusive” (Faragher *et al.*, 2005: 105). They found that “job satisfaction was much more strongly associated with mental/psychological problems than with physical complaints” and very closely allied with burnout. It also correlated but slightly less strongly with depression, anxiety, self-esteem, general mental health issues. Whilst the relationship between job satisfaction and strain was also relatively high, correlation with subjective physical illness was more modest (Faragher *et al.*, 2005). Interestingly they found the lowest correlations were for cardiovascular disease and musculoskeletal disorders. This closer association between job satisfaction and mental health is important for the emphasis placed in relation to policy. Faragher *et al.* felt a causal inference was possible from their meta-analysis following the logic that:

“many people spend a considerable proportion of their waking hours at work. If their work is failing to provide adequate personal satisfaction – or even causing actual dissatisfaction – they are likely to be feeling unhappy or unfulfilled for long periods of each working day. It seems reasonable to hypothesise that such individuals are at increased risk of experiencing a lowering of general mood and feelings of self-worth while at work culminating in mild levels of depression and/or anxiety. If continued unresolved for any length of time, such emotions could eventually lead to emotional exhaustion, particularly if the individual is unable to prevent their feelings from spilling over into their home/social life” (Faragher *et al.*, 2005: 108).

This causal link has important implications for the design and delivery of employee health intervention programmes.

3.3 Mental health promotion interventions in the workplace: what we know from the evidence

The evidence base for interventions is on the whole inconclusive. Martin *et al.* (2009) conducted a systematic review and meta-analysis into the effects of health promotion interventions in the workplace on depression and anxiety symptoms. The analysis found small, but positive overall effects for symptoms of depression and anxiety in the interventions reviewed: “the interventions with a direct focus on mental health had a similar beneficial effect on symptoms as those with an indirect focus on risk factors” (Martin *et al.*, 2009:14). This led Martin *et al.* to conclude that in order to reduce depression and anxiety symptoms “a broad range of interventions using health promotion in the workplace appears to be effective in that those focused directly on symptoms show similar results to those that reduce symptoms indirectly by focusing on risk factors” (Martin *et al.*, 2009: 15). This is perhaps unsurprising as effect size would only be large if the stress of work was the only causal factor, but research indicates that there is a complex interplay between job stress and other factors (LaMontagne, *et al.*, 2007).

Research has assessed the effectiveness of some specific mental and physical health promotion programmes classified as Employee Assistance Programs (EAP's) or Health Promotion Programs (HPP's). EAP's are workplace programs in which employees receive short term counselling for issues such as alcohol, drugs, or other personal, behavioural or family problems. Workplace HPP's on the other hand traditionally offer educational, organisational or behavioural interventions that aim to support the development and maintenance of health related behaviours conducive to the wellbeing of the overall workforce. These include programs such as stress management; fitness; health information and assistance; and in some cases provide supervised day care for children. The premise behind these two approaches is that they improve health and this reduces absenteeism and costs.

A study undertaken by Macdonald *et al.* (2006) that targeted Human Resource managers in worksites with 100 or more employees in Canada found that “overall, Canadian worksites favour a health promotion and treatment approach over a deterrence approach for addressing health and substance use issues in the workplace”. They also found that an “uneven system of health

promotion, treatment and deterrence” had developed within Canadian worksites (Macdonald *et al.*, 2006: 121). This study had the lowest response figures for their questionnaire based study from retail and construction, which could be an issue with the sampling, or could be indicative of the level of services being offered in those sectors. The study was designed to provide a “snapshot of the types of workplace health programs available in Canadian worksites” (Macdonald *et al.*, 2006: 124) however they found that due to the varied nature of these initiatives, comparison between programs was not possible. Interestingly they found that:

“EAP’s are under-represented in retail trade and construction industries. Generally, the wages and benefits for retail and trade workers are less than for other work sectors, which might explain the ... EAP’s in this work sector. In the construction work sector, many employees are hired on contract, which might explain their low likelihood of EAPs...These findings suggest that EAP’s are primarily an employee benefit for the more privileged employees” (Macdonald *et al.*, 2006: 124).

These types of programme appear to be more pervasive in countries that place greater emphasis on private health insurance in their funding for health care than is the case in the UK. In such countries there are direct cost implications of employee ill-health for employers. Addley *et al.* (2014) state that “nowhere has this perspective been so wholeheartedly adopted by organisations as in the United States, where the ‘good health is good business’ maxim has been formally enshrined in a managerial approach known as ‘health and productivity management’ (HPM), a strategy employed by organisations to manage employee health risks and productivity” (Addley *et al.*, 2014: 248). Health promotion is an integral part of an organisational business strategy and the return to investment is calculated in the context of a funding and business model for health care in organisations. In the UK the costs of ill-health are calculated in terms of days lost and productivity costs. In the US and other countries where there is significant private healthcare, there are also possible direct financial costs for organisations in the form of insurance premiums. This is recognised by Addley *et al.* who state that:

“..in comparison with the United States, WHP [Workplace Health Promotion] is a relatively new phenomenon in the United Kingdom and organisational uptake of programmes has been slow. A primary factor in the limited adoption of these programmes is the fact that the medical care costs are met by the National Health Service, thereby limiting the obvious financial benefits of WHP programmes” (Addley *et al.*, 2014: 248).

Addley *et al.*’s study examined Health Risk Appraisal (HRA) effectiveness in the UK following the 2008 Black report which found inconclusive evidence in support of HRA. They conducted an RCT in the Northern Ireland Civil Service (NICS) using a questionnaire for selected staff groups chosen for sickness and absence rates. They found no statistically significant improvements in the groups with the intervention. However minor improvements were noted and as the goal had been for employees to make small, positive changes they felt that this was a success of the programmes and could have a larger effect when extrapolated out to a larger population and have a large public health impact. They noted the limitations in the study design and concluded that “from an employers’ perspective, the study does not provide much concrete evidence on the effectiveness of the interventions or their impact on productivity. Nevertheless, compared with the option of doing nothing, the study provides preliminary evidence that HRA’s may help some employees to maintain or improve health behaviours, whereas augmented HRA’s may potentially help a larger population of employees” (Addley *et al.*, 2014: 257).

However there is increasing recognition of the economic impact of ill-health at work in the UK. Knapp *et al.* (2011) using data from the Labour Force Survey estimate that “11.4 million working days were lost in Britain in 2008/9 due to work related stress, depression or anxiety. This equates to

27.3 days lost per affected worker” (Knapp *et al.*, 2011: 20). They investigated the effectiveness of workplace-based enhanced depression care consisting of a screening questionnaire completed by employees and care management for those who were found to be at risk or suffering from depression/anxiety disorders. Those who were identified were given a six session (over twelve weeks) course of cognitive behavioural therapy, CBT. The intervention was justified in relation to the clinical evidence base for the effectiveness of CBT in tackling depression and managing associated productivity losses. Knapp *et al.* (2011) found that in line with similar evidence from Australia, productivity improvements outweighed the cost of intervention and they estimated that at 2009 prices, £30.90 covered the cost of screening, follow-up assessment, and care management. For those at risk the cost was £240, however they note that computerised courses may be “cheaper and less stigmatising to individual workers, but less is known about their longer term effectiveness” (Knapp *et al.*, 2011: 20). They argue that “the results show that from a business perspective the intervention appears cost-saving, despite the cost of screening all employees. Benefits are gained through both a reduction in the level of absenteeism and improved levels of workplace productivity through a reduction in presenteeism. However, the impact may differ across industries” (Knapp *et al.*, 2011: 20-21).

Knapp *et al.* (2011) note that there are a wide range of possible approaches to mental health promotion in the workplace including:

“flexible working arrangements; career progression opportunities; ergonomics and environment; stress audits; and improved recognition of risk factors for poor mental health by line managers. Other measures targeted at general well-being can include access to gyms, exercise and sports opportunities and change to the canteen food” (Knapp *et al.*, 2011: 22).

For example, they cite a study from Scotland that showed more active commuting habits significantly improved mental health. Knapp *et al.* (2011) additionally undertook a multi-component health promotion intervention consisting of: personalised health and well-being information and advice; a health risk appraisal questionnaire; access to a tailored health improvement web portal; wellness literature; and seminars and workshops focused on identified wellness issues. The cited costs were £80 per employee per year. A quasi-experimental evaluation of the intervention found significantly reduced stress levels, reduced absenteeism and reduced presenteeism when compared with control group. On the basis of this evidence Knapp *et al.* (2011:22) suggest that “promotion of long-term mental well-being may be associated with reduced longer term risk of poor mental health, although the evidence for this remains weak”. However, the research only sampled white collar enterprises with 500 or more employees. Nevertheless they conclude that “a strong case can be made to businesses that workplace well-being interventions can be significantly cost-saving in the short term, but some smaller companies may need public support to implement such schemes” (Knapp *et al.*, 2011:23).

Overall, this evidence suggests that individual and environmental interventions cannot be independent of one another and while there are a myriad of complex ‘interventions’ available, a multi-component approach is likely to be more effective. In line with this LaMontagne, *et al.*, (2007) argue for multi-component approaches to mental illness and workplace wellbeing. This perspective is summarised in Appendix 2.

3.4 The construction and retail sectors

Research conducted by Marchand (2007) examined potentially risky occupations and industries, including construction, in Canada. Using a sample of 77,377 workers in 139 occupations and 95 industries from cross-sectional survey data, they stratified by employment type and tested for observable differences among workers who report poor mental health. The results of the study indicated that “mental health problems are widely distributed among members of the labour force”

and that occupations “show significant variations” (Marchand, 2007: 279). However they identified ten occupations and nine industries at higher risk of workers reporting poor mental health. The risky occupations were found to be concentrated in four of ten major groups (in order of importance): “1) health; 2) sales and service; 3) trades, transportation and equipment operators, and related occupations; 4) occupations unique to processing, manufacturing and utilities” (Marchand, 2007: 279).

Thus, after health workers, the two sectors deemed to be the most vulnerable in this survey of the Canadian workforce are those in sales and services which includes retail, and trades, transportation and equipment operators which includes the workers in construction. The data further showed that within the sales and service occupations, “chefs and cooks, cashiers, and cleaners” had greater tendency to report poorer mental health (Marchand, 2007: 279). In the trades and transportation industry, those who were at higher risk of mental health issues were “longshore workers and material handlers, motor vehicle mechanics, and public works and other labourers” (Marchand, 2007: 280). The research argues that “each of these occupations may have, of course, its own work organisation conditions that may explain the higher prevalence of poorer mental health. For example, irregular work schedules and job insecurity may be determinants of poorer mental health outcomes for cashiers, whereas physical demands more strongly influence mental health outcomes in longshore workers and material handlers” (Marchand, 2007: 280). These results are pertinent for this review and suggest that the retail and construction sectors could be particularly susceptible to stress and workplace wellbeing issues.

3.4.1 Workplace wellbeing in the construction industry

In Australia, blue-collar workers are predominantly male and account for a large subset (approximately 30% of the Australian workforce (Du Plessis et al., 2013). Du Plessis *et al.* (2013) conducted a study focussed on construction workers and considered practice strategies for health promoters in a specific workplace setting. The work shows that male blue-collar workers are considered to be at the bottom of the socio-economic power gradient and have poor health outcomes, higher rates of disability, chronic disease and mortality. Some of this is linked to the physical nature of their work and musculoskeletal degradation however, the construction industry is also known to “operate in stressful environments” (Du Plessis *et al.*, 2013: 716). Their research supports that of LaMontagne *et al.*, (2011) who show that job strain resulting in psychological risk accounts for approximately 13.2% of all the incidences of depression in Australian working males.

Love and Edwards (2005) investigated whether employees’ psychological wellbeing in terms of health and job satisfaction could be reliably predicted in the construction industry. In their review of previous research they state that increasing levels of stress have been reported for construction project managers and note the importance of social support stating that “positive or helpful social interaction available from management and co-workers has been identified as a moderator in the etiology of stress” (Love and Edwards, 2005: 91). Interestingly, paralleling other research they find that job strain is influenced by both the organisational environment and individual factors. The latter implies that individual risk factors can have wider impacts.

Love *et al.* (2010) in an Australian study found that “construction professionals are subjected to a plethora of occupational demands that can have a negative effect on their psychological wellbeing. Such demands can have an adverse influence on individual and organisational performance” (Love et al., 2010: 650). They show that stress in the workplace (in relation to the construction industry) can be managed using a variety of tools but also indicate that it can be tackled at a number of levels (see Figure 5). This dimensional notion in terms of where to place resources in order to combat stress, is important and mirrored in other research.

Figure 4: Levels of intervention for combatting stress in the workplace (Love et. al. 2010)

Level	Focus of intervention or tool on
Individual level	Diet; exercise; cognitive techniques; relaxation training.
Team level	Supervisory training; team building; sensitivity training focusing on issues including racism and sexism etc.
Structural or organisation level	Modification of work time/shift patters; reducing physical hazards; improving career ladders; modifying the use of training and technology; job rotation; enrichment and empowerment.

A comparison of these studies of the construction sector shows some stark similarities (see Figure 6). The studies indicate that there are specific challenges particular to the construction industry that makes intervention difficult. For example, the organisational aim of maximising productivity may impact negatively on workplace wellbeing for example by acting as a:

“barrier to onsite interventions, particularly in those programs that involve group formats. In the Australian construction and manufacturing context, the workplace often consists of large numbers of subcontractors that each have their own policies, procedures, and company cultures. Unlike office-based white-collar environments, this ‘multiple employer workplace environment’ often diffuses the capacity to co-ordinate, manage, and measure workplace health initiatives as the environment and workforce continually changes. This makes it particularly challenging to keep track of individuals in the workforce, to achieve consistency with group-based initiatives and sustain longer term interventions” (Du Plessis *et al.*, 2013: 719).

Du Plessis *et al.* (2013) also highlight problems with the high proportion of short-term projects in the construction industry which result in a loss of continuity. This suggests that short term contracts and other employment patterns can affect the health and wellbeing of the workforce with potential associated costs to the industry in terms of ill-health and disability. Short term contracts to drive down costs may be a false economy in this respect since the health and wellbeing of employees also impacts on productivity. Du Plessis *et al.* (2013) call for “more sustainable occupational health and safety, and well-being policies within blue-collar industries” and cite a “dearth of literature, particularly in relation to blue-collar workers and the use of randomized controlled trials in this field” which they say necessitates individual workplace programs to publish their findings (Du Plessis *et al.*, 2013: 719).

Figure 5: Workplace stress and poor mental health among ‘blue collar’ workers and in construction

Author, industry and location	Causes of stress	Manifestations of stress/potential consequences
Love and Edwards (2005) Construction UK	High job demand; low levels of job control; work overload; long working hours; role ambiguity and conflict; the diverse range of personalities encountered in the project environment; poor communication; limited resources; insufficient time spent in the family/home environment; financial	Drug abuse; sexual difficulties; insomnia; nightmares; relationship problems; alcoholism.

	pressures.	
Du Plessis <i>et al.</i> (2013) 'Blue collar' workers and construction Australia	Competitive tendering in construction; under-resourcing; unrealistic timeframes for procurement and construction; embedded structural frameworks with expectations for long work hours; living and working away from home; weekend work and/or irregular work; development of subcultures with codes of conduct developing ideas around masculinity and stoicism that prevent help seeking behaviours and promotes poor diet, smoking and alcohol consumption.	Ability to maintain healthy work life balance and relationships; poor health outcomes; higher rates of disability, chronic disease and mortality; poor diet; alcohol misuse; heavy smoking; self-reported tiredness, headaches, low energy; increased workplace accidents; stress; burnout; and low productivity.
Love <i>et al.</i> , (2010) Construction managers Australia	Work overload; role ambiguity and conflict; unpaid overtime; restrictive career progression; the diverse range of personalities encountered in their work environment; travel; changing technology; redundancy; client demands; limited resources; financial pressures; budget constraints; and solving trivial but pressing and irksome problems.	Stress and poor mental health (N.B. did not explore other factors as research had specific focus).

Together this evidence suggests that interventions need to be focussed at the individual level to support wellbeing but also need to impact on the environmental conditions in which a person is working. In line with this, Love *et al.* (2010) state that while self and social stress were contributors to poor mental health, "the presence of work supports may be an important factor in preventing stress" and that "social and work supports may have a preventative role in stress conditions arising from the workplace by actively promoting good mental health" (Love *et al.*, 2010: 657).

3.4.2 Workplace wellbeing in the retail industry

Only one study (Wilson *et al.*, 2004) was identified that specifically explored workplace wellbeing in the retail industry. This was a study from the US where 1130 questionnaires were completed by employees of a national retailer. The research examined the views of employees in relation to the impact of organisational characteristics on their health and wellbeing. Wilson *et al.* (2004:582) found that "work characteristics influence psychological work adjustment factors that ultimately affect employee health and well-being". The study also found evidence to support the "fundamental role organisational climate plays in the effectiveness of an organisation" (Wilson *et al.*, 2004: 582). This study aids understanding of the importance of the role of organisation and environmental factors in determining the wellbeing of the workforce. However, the study does not report on successful interventions to support workplace wellbeing in the retail sphere.

3.5 Summary

Traditionally, policy and practice in relation to mental health in the workplace has lagged behind that in occupational health and safety however, developments in this area are beginning to catch up (Danna and Griffin, 1999). Whilst there is evidence to support the need to intervene to support mental health and wellbeing in a workplace setting, less is known about the effectiveness of interventions, particularly in construction and retail. There is also a poorly understood distinction

between managing mental health in the workplace, and workplace wellbeing more widely. This is largely because the impact of work-related and non-work-related factors are difficult to differentiate. Hence there is a need for a holistic approach when developing workplace interventions.

The majority of the evidence to date focusses on the relationships between workplace stress, mental health and wellbeing on the one hand and economic costs usually in terms of productivity related losses, on the other. The evaluations that do exist are mostly single case studies within one organisation conducted as a cost-benefit analysis and there has been some speculation about potential biases in such cases (Goetzel and Ozminkowski, 2006; Kirk and Brown, 2003). There are also some interesting small scale projects. For example work on promoting resilience in the workplace in the context of adolescent focused school based CBT combined with an interpersonal skills approach (Millear et al., 2008). Grant et al. (2009) have also conducted an RCT looking at the role of coaching in enhancing goal attainment, resilience, and workplace wellbeing. Their study found short term coaching could be effective and evidence based executive coaching can be valuable in helping people deal with the uncertainty and challenges inherent in organisational change. However, this study was undertaken in quite specific conditions with a specific sub-set of senior employees. These studies are an indication of a promising line of investigation, however they lack robust evaluation.

In addition, whilst existing research suggests that retail and construction are particularly high risk industries, the evidence base is limited and does not provide support for particular interventions. A multi-level approach (Figure 5) with interventions at an organisational, team and individual level, maybe the most effective in facilitating workplace wellbeing (Cotton and Hart, 2003; LaMontagne, et al., 2007; Martin et al., 2009). However, as LaMontagne *et al.* put it, “integration of primary, secondary, and tertiary intervention – necessary for the full realisation of a systems approach – seems to be rare in current practice...this disconnect between tertiary-level and other intervention research and practice at the organisational level represents unrealised preventive potential” (LaMontagne, *et al.*, 2007: 225). There is also indication that targeted individual support works best alongside a more general workplace wellbeing emphasis.

Increased attention (both in the UK and internationally) to mental health and wellbeing has resulted in greater responsibility for intervening being placed within workplace settings. In this context there is a corresponding need for evaluation of workplace interventions in order to build shared knowledge about good practice in general and in specific sectors.

4. Health promotion at work: Nutrition, physical activity and smoking cessation

4.1 Introduction

Interventions to promote health and reduce health risk at the workplace focus on improved nutrition, higher levels of physical activity at work and smoking cessation.

A large number of interventions aiming to raise physical activity, improve nutrition and reduce smoking are reported in the literature. A common purpose is to improve quality of life and the productivity of workers and to reduce future health care cost associated with cardiovascular or non-transmittable diseases. However, evidence relating to the effectiveness of interventions in these areas is mostly inconclusive, and in many cases, there are no significant changes for example in relation to eating habits, levels of physical activity or other specific measurements such as Body Mass Index or blood pressure (Dugdill et al., 2008).

A number of systematic reviews and meta-analysis have been conducted in order to identify and classify the effectiveness of intervention e.g. in relation to reduction of cardiovascular risks, other non-communicative diseases and obesity; and effects on work productivity (Anderson et al., 2009; Aneni et al., 2014; Benedict and Arterburn, 2008; Christie et al., 1996; Conn et al., 2009; Dugdill et al., 2008; Freak-Poli et al., 1996; Gudzone et al., 2013; Kahn et al., 2002; Ni Mhurchu et al., 2010; Proper et al., 2003; Proper and van Mechelen, 2008; van Dongen et al., 2012; Verweij et al., 2011) (World Health Organization (WHO), 2009). In general, the common finding is that strength of the evidence for the effectiveness of strategies is relatively low and effectiveness is also influenced by the characteristics and quality of the studies and the type of research design used.

4.2 Programmes focussed on nutrition and physical activity

As a result of the increase in the number of overweight or obese individuals around the world, a range of policies, programmes and strategies have been implemented in order to reduce the related comorbidity. The workplace has been identified as an important setting in which to implement interventions to reduce the health care risk associated with inactivity and overweight (World Health Organization (WHO), 2011). Strategies that merge health protection and health promotion in the workplace are argued to be fundamental in order to reduce cardiovascular risks and non-communicative diseases (e.g. diabetes) (Schulte et al., 2007).

Research has documented a large number of strategies focussed on exercise and healthy eating have been implemented in the work setting. These include programmes focussed more on individual behaviour and those directed to changes to company policies and physical and social environments (see Tables A3.1 and A3.2 in Appendix 3 for a summary). These have been implemented largely as a response to the negative effects that obesity and overweight have on the productivity levels of individuals and their impact on health care cost (World Health Organization (WHO), 2011). For example, in an investigation of the effects of physical activity, dietary behaviour and Body Mass Index (BMI) on the workplace productivity of employees in construction, manufacturing, transportation and services industries Cash *et al.*, (2012) found that BMI (of females) and fast food access (for males) were inversely associated with productivity.

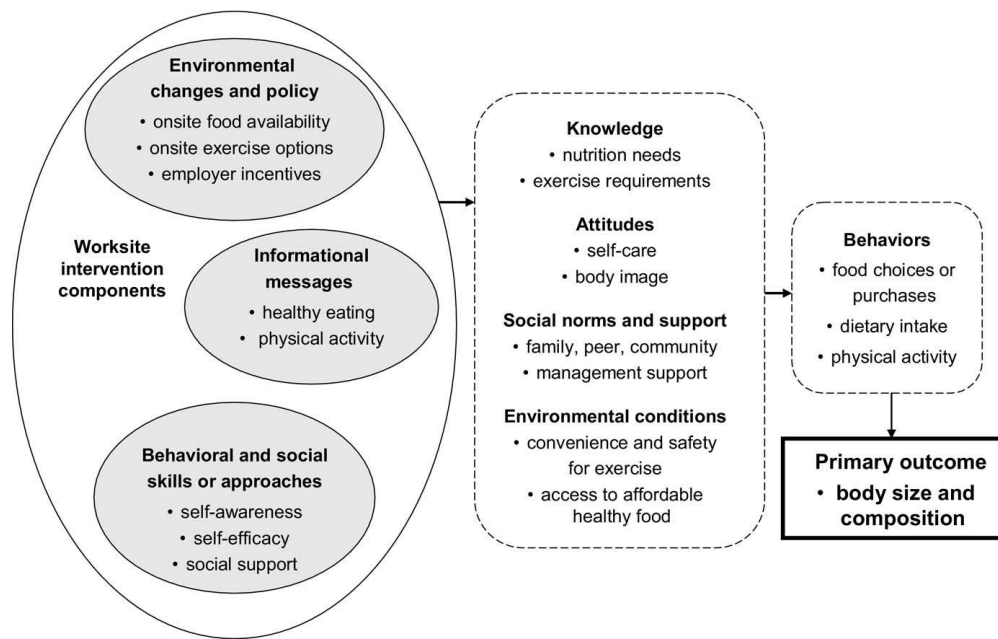
Workplace interventions targeted to physical activity and nutrition tend to be either: 1) Interventions associated with company policies, which include changing the rules and procedures for employees in areas such as health insurance benefits, or costs, reimbursement for health club membership and or time allocated for breaks or meals; 2) Environmental interventions, which include access to healthy foods, cafeteria modifications, enhancing opportunities to engage in physical activity and creating exercise facilities inside the company and/or; 3) Individual level

interventions, such as counselling, exercise programmes and nutrition and healthy eating changes (Anderson *et al.*, 2009).

Informational and educational programmes have also been found to be useful tools for producing changes in nutrition and physical activity. Such strategies include: building knowledge; didactic instructions; health-related information; posters or pamphlets and nutrition education (Anderson *et al.*, 2009). These interventions can involve individual or group behavioural counselling skills-building activities, use of rewards or reinforcement and inclusion of co-workers and family members for support.

Anderson *et al.*, (2009) presents an analytic framework to develop worksite nutrition and physical activity interventions (illustrated in Figure 7). The framework highlights the importance of environmental changes and policies, information, knowledge, attitudes and behaviour. The framework emphasises the potential linkages between these components of workplace interventions and their impact on knowledge, attitudes, norms and conditions. Ultimately the aim is for changes in behaviour leading to improvements in health.

Figure 6: The Anderson et al. (2009) model of workplace intervention and behavioural change



Source: (Anderson et al., 2009)

In many cases, interventions use only one or two strategies implemented at the individual level. However, there is evidence that multiple-component interventions tend to be more effective in creating positive behaviour changes. One example is the study by Ferdowsian et al., (2010), who found that there were significant differences between workers who received access to gym with education and/or time allowances compared to the control group and individuals who received only gym access. In addition, a systematic review conducted by Freak-Poli et al. (1996) found that, while not conclusive, multi-component programmes tended to more of an effect in increasing physical activity (although that effect was small). The meta-analysis conducted by Verweij *et al.*, (2011) also indicated that interventions with the joint objective of improving physical activity and eating behaviour were moderately effective.

Two systematic reviews (Proper and van Mechelen, 2008; van Dongen et al., 2012) assessed evidence for the cost-effectiveness of worksite physical activity and nutrition interventions. They found that evidence for cost-effectiveness was inconclusive or relatively weak. However, they note that that willingness to pay for the reduction of cardiovascular risks is unknown and therefore it is not possible to draw conclusions in this area. However, interventions in nutrition and interventions combining a focus on nutrition and physical activity are more cost-effective (in contrast to 'usual' care practices) particularly in reducing cholesterol levels and cardiovascular risks (van Dongen et al., 2012).

A small number of studies have included environmental modifications in a more general programme to increase physical activity or improve nutrition. Engbers et al. (2005) conducted a systematic review aiming to identify how environmental modifications influence worksite health promotion. The main findings were that interventions that use environmental strategies, such as food labelling, promotional material or expanding the availability of healthy products had positive effects on the dietary intake of fruit, vegetables and fat. On the other hand, evidence relating to physical activity interventions that included environmental strategies was inconclusive.

4.2.1 Interventions focussed on nutrition

The most common purposes of intervention in nutrition have been to increase the intake of fruits and vegetables; to improve dietary habits of individuals and to prevent obesity and weight gain. According to the systematic review conducted by Gudzone *et al.* (2013) interventions that include a nutritional component usually involve one or more of the following: counselling for the participants; environmental changes in order to improve eating habits; information given to workers; introduction of a healthy menu in the cafeteria and; peer or family support.

A study conducted by Beresford *et al.* (2001) involved a '5 a day' worksite programme to increase fruit and vegetable consumption. The intervention included changes at the individual level and in the work environment. Strategies were divided in three phases, first awareness about the importance of eating fruits and vegetables; then information was given on the benefits of eating fruits and vegetables and self-assessments on knowledge of this topic was provided to all participants; finally, individual skill building and environmental changes were encouraged at the worksite in order that individuals adapted to their new eating behaviours. The results of this intervention suggest that it is possible to increase the consumption of fruits and vegetables using worksite interventions. Internet-based information has also been included as a component of interventions aiming to reduce weight and body fat. The results of the study by Carnie *et al.* (2013) show that information distributed in this way can have a positive effect on final outcomes. However, the effectiveness was found to be low and could not be attributed solely to this particular type of intervention.

Overall (see Tables A3:1 and A:2 in Appendix 3) the evidence identifies a number of key factors that are linked to success in nutrition focussed interventions: that interventions also include physical activity components; that education about nutrition will be available; environmental changes (e.g. increasing the availability of healthy food options; giving personalised advice and feedback on diet; employees are involved in the planning and design of strategies and; reducing the price of healthy food (Steyn *et al.*, 2009). However, although interventions that involve nutrition strategies have been found to be effective, the evidence on the cost-effectiveness of such strategies is inconclusive (Ni Mhurchu *et al.*, 2010; van Dongen *et al.*, 2012).

4.2.2 Physical activity focussed interventions

A wide range of interventions aiming to modify physical activity behaviour have been implemented. A systematic review conducted by Vuillemin *et al.* (2011) using only evidence from studies conducted in Europe, found that the most common workplace interventions aiming to increase physical activity are: exercise training; counselling; stair use; active commuting and walking. According to a systematic review by Kahn *et al.* (2002) strategies can be implemented at three non-mutually exclusive levels: information-based approaches; behavioural and social approaches and; environmental and policy approaches.

Evidence from systematic reviews of the effectiveness of worksite physical activity programmes is somewhat inconclusive and in some cases contradictory (Dishman *et al.*, 1998; Dugdill *et al.*, 2008; Proper *et al.*, 2003). According to Dishman *et al.*, (1998) worksite interventions do not have an effect on physical activity. Dugdill *et al.* (2008), assessed the effectiveness of stair walking, walking, action travel and multi-component interventions and found limited evidence for the effectiveness of walking interventions but that workplace counselling had a positive effect in influencing participation in physical activity. Proper *et al.* (2003) assess evidence on the effectiveness of worksite physical activity programmes on physical activity, cardiorespiratory fitness; muscle flexibility; muscle strength; body weight and body composition and other health related aspects. The main conclusion of Proper *et al.* is that the principal objective of worksite physical activity interventions, namely increasing physical activity, is achieved. However evidence for improvement of cardiorespiratory fitness was not found. In line with Proper *et al.* (2003) while Vuillemin *et al.*

(2011) found moderate evidence for increased physical fitness when commuting interventions were implemented (see below), evidence for the effectiveness of workplace interventions in relation to obesity-related outcomes was inconclusive. Kahn *et al.* (2002) found that multisite and multicomponent interventions are the most effective in changing physical activity behaviours.

In line with the evidence from these systematic reviews, evidence in relation to specific types of interventions such as information and counselling is mixed. Interventions that aim to reduce the cardiovascular risk of different types of workers using the internet as the main tool of communication and for transference of information have been used in order to improve the general health of workers (Aneni *et al.*, 2014; Carnie *et al.*, 2013; Robroek *et al.*, 2012). In general, these type of interventions have not been found to be cost-effective nor do they produce important changes in the levels of VO2 max, BMI or blood pressure. Similarly the evidence for the effectiveness of counselling based interventions is largely inconclusive and in most cases depends of the type of population targeted as well as other aspects of the study (Pignone *et al.*, 2003). However, Dugdill *et al.* (2008) reports strong evidence that workplace counselling interventions can change physical activity behaviours.

Another common type of intervention is the use of pedometers. A systematic review conducted by Freak-Poli *et al.*, (1996) analysed effectiveness of interventions using pedometers. The results suggest that there is limited evidence of the effectiveness of this type of intervention. Freak-Poli *et al.* (1996) attribute this to issues related to the research design of the studies and the population studies. However, individuals studies have found a positive effect of pedometers on the amount of walking by individuals (Thomas and Williams, 2006). Additionally, improvements in behavioural and anthropometric risk factors were evidenced when pedometers were used with other physical activity strategies (Freak-Poli *et al.*, 2011).

One other intervention of note is the ‘bike to work’ commuting programme reported by Dubuy *et al.* (2013). This included individual and environmental elements in three components: cycling contests, online programme and dissemination of information. The main results suggested that this type of intervention had a positive effect on the level of physical activity of individuals and also in the willingness of commute to work. This, in line with the evidence of the systematic review conducted by Vuillemin *et al.* (2011) suggests that commuting to work can be a useful target for physical activity interventions.

In conclusion, a large number of interventions aiming to increase physical activity in or connected to the worksite have been implemented in the last fifteen years. Most interventions are part of a multicomponent programme, which includes strategies to change eating habits and counselling. However, systematic reviews analysing the effectiveness of physical activity interventions provide inconclusive results. In most cases, the evidence for increased physical activity is low or moderate. The cost-effectiveness analysis suggests that interventions in this area are in some cases cost-effective compared to ‘usual’ care practices but there is not strong evidence in this area.

4.2.3 Interventions including Construction workers

Although most studies did not involve interventions for specific types of workers; some studies reporting on nutrition and physical activity interventions reported that their sample included construction. For example, Gram *et al.*, (2012) implemented a 12 weeks intervention that included construction workers. The main objective of the study was to evaluate the effect of tailored exercise programmes. The result revealed that there were positive changes in the levels of VO2 max and in the reduction of cardiovascular risks over the whole sample. The construction sector was not noted as an exception in any way. In general, studies that have included workers from the construction sector did not report different effects for this group. In all studies that included workers from

different sectors, the interventions did not have sector specific similar characteristics and aimed to reduce cardiovascular risks, increase physical activities and reduce the intake of unhealthy food.

4.3 Smoking Cessation Interventions

The Centre for Economics and Business Research (2014) in a report for the British Heart Foundation recently estimated that smoking breaks cost British businesses £1,815 per year for each full-time worker¹. The main reason for these costs are that smoking can lead to ill-health linked to a variety of health problems including cardiovascular and respiratory diseases, and cancer. According to Braun and Morton (2008:6), studies also “show that what people do for a living affects their smoking habits, so certain industries may experience greater costs than others.” Braun and Morton (2008:6) report that the 2003 Canadian Tobacco Use Monitoring Survey indicates that the sectors with the highest smoking rates of 36%, 35% and 30% were respectively: trade (including construction), transport or equipment operators; processing, manufacturing or utilities occupations and; sales or services (including retail).

Not surprisingly then there has been a range of workplace interventions undertaken to encourage smoking cessation (see Appendix 3 Table A3.3). Some of these interventions involve the creation of a designated smoking area for workers. Since this is already a legal statute in the UK, reports on these types of interventions were excluded from the review.

The majority of smoking interventions discussed in the literature are multicomponent in nature, usually combined with either increasing physical activity or improving dietary behaviours. There is considerable variety in the approach adopted. For example, Nilsson *et al.* (2001) propose an 18 month lifestyle intervention in order to prevent cardiovascular disease. The intervention included 16 group sessions a year and individual counselling. They recorded a statistically significant decrease in smoking prevalence, when compared to the control group, at both the 12 and 18 month follow-up dates. In contrast, Prior *et al.* (2005) aimed to reduce cardiovascular risk factors through a very short intervention: a 15 minute screening followed by individual counselling with a health professional. Since there was no control group in their experiment, they had to compare their results to changes in smoking behaviours in the general population. They found that the smoking cessation results were in line with the decreased prevalence of smoking in the general population of Switzerland.

Two systematic reviews in this area are Engbers *et al.*, (2005) and Soler *et al.* (2010). Of the interventions covered in each review, the following was found to be the most successful: individual assessments of health risks and feedback (AHRF) *together with* other intervention components, such as counselling, group sessions and regular follow-ups. Mixed to poor results were found for interventions that merely attempted to educate, or raise awareness in participants via reading materials or one-off interventions. Studies in this area appear to focus on identifying high risk individuals to participate in programs. Viewing the work place as a community in and of itself, this suggests that there may be perception of secondary, or knock-on, benefits from targeting high risk individuals in the population.

4.3.1 Smoking Cessation Interventions in the Construction Sector

Two of the papers included in this review focussed specifically on the construction sector (see Appendix 3 Table A3.3). Both involved telephone interventions. Groeneveld *et al.* (2011) targeted blue- and white-collared workers in the construction industry in the Netherlands. They first screened the sample for high-risk workers, and then offered a detailed 6 month intervention programme to

¹ Centre for Economics and Business Research: Report for the British Heart Foundation (2014): <http://www.cebr.com/reports/smoking-costs-uk-businesses-8-7bn/>

assist the sample to either improve their physical activity participation and dietary behaviour, or to quit smoking. Their intervention included three face-to-face and four telephone contacts with a health professional and found that there was a beneficial impact on smoking behaviours at the 6 month follow-up, but this was not sustained at the 12 month follow-up. Sorensen *et al.* (2007) used a telephone-delivered and mailed intervention to promote smoking cessation and increase fruit and vegetable intake among construction workers in the USA and Canada. Based on participants' reports of whether they had or had not smoked in the 7 days previous to the interview, they found that statistically more participants in the treatment group had quit smoking at the 6 month follow-up date.

These two studies prove mixed results for telephonic interventions to encourage smoking cessation in the construction sector. More research is required to draw any definitive conclusions, but at a minimum the work of Groeneveld *et al.* (2011) highlights the need for sustained intervention programs to encourage smoking cessation suggesting that dealing with a nicotine addiction requires a long-term, perhaps even a lifelong effort.

4.4 Summary

Overall evidence on the effectiveness and cost-effectiveness of interventions aiming to improve health by reducing obesity and cardio vascular risks through improvements in nutrition, increased physical activity and smoking cessation is inconclusive. Interventions in this area are usually multicomponent including strategies to increase the consumption of fruits and vegetable, change diets, increase participation in physical activity, reduce smoking levels and provide information, counselling and support to the participants. Some major effects are linked to changes in the working environment but strategies directed to individuals are more common than environmental or policy changes. The multicomponent nature of these interventions reflects the linked effects of diet, physical activity and smoking behaviour on health. As noted by Braun and Morton (2008:14) "the most successful approach to smoking cessation makes room for a range of treatments that address all aspects of the addiction - usually pharmacological therapy along with counselling and behavioural support." This statement is made specifically in relation to smoking but could easily be generalised to diet and physical activity participation.

We found that limited evidence in this area relating to participants working in the construction or retail sectors or have a particular focus on these sectors. Most industry based interventions target workers over a broad number of industries and do not design programmes specific to sectors.

One limitation of the research conducted in this area that is worth reflecting on is that often, although not always, the analysis relies on self-reported figures from participants on what they eat, their physical activity and the number of cigarettes smoked or smoking frequency. This may not always be reliable. For this reason some of the reported results in these areas need to be interpreted with caution.

5. Physical Health and Safety in the Workplace

5.1 Introduction

This section of the report reviews evidence related to general physical health in the workplace and is divided into two areas: (i) musculoskeletal disorders and (ii) health and safety practices focused on reducing accident related injury risk and other industry related health risks. For each area the motivation for health interventions is discussed and the existing evidence as it applies to the workplace in general, and the construction sector in particular is reviewed. However, in relation to health and safety the primary focus is on evidence from the construction sector where health and safety measures to prevent accidents and related injury are a major concern. For a summary of the evidence reviewed see Tables A4.1 and A4.2 in Appendix 4.

5.2 Preventing and Managing Musculoskeletal Disorders (MSDs)

MSDs are defined by the NHS (2012)² as health disorders affecting “the muscles, tendons, ligaments, nerves and the blood system and can include carpal tunnel syndrome, tendonitis, lower back pain and tension neck syndrome”. MSDs are cumulative in nature and eventually lead to productivity loss, increased sickness absence and, potentially, occupational disability. Shaw *et al.* (2007) claim that in the UK, MSDs are the most common form of occupational ill-health although the incidence of MSDs varies both by industry and occupation. The Health and Safety Executive (2014)³ report that labour Force Survey data show that across industrial sectors, higher than average rates of MSDs are found in specialised construction, agriculture, postal and courier and health care. Additionally, in a comparison of occupations, building trades, nurses, personal care and skilled agriculture trades had higher rates of total cases of MSDs. This evidence suggests that the construction sector is particularly at risk.

The studies reviewed in this section focus on either preventing MSDs (primary interventions) or managing pain and enabling return to work (secondary and tertiary interventions). Policy and guidance in this context is provided for Great Britain by the Health and Safety Executive (“HSE, 2014) for Northern Ireland and the Republic of Ireland by the Health and Safety Authority/Executive Northern Ireland (HAS&E NRI, 2013) and for the EU by the European Agency for Safety and Health at Work (EASHW, 2008). All of these organisations give guidance to employers on workplace interventions and provide informative case studies. EASHW (2008:6) states that “MSDs are the biggest cause of absence from work in practically all Member States. In some states, 40% of the costs of workers’ compensation are caused by MSDs and up to 1.6% of the gross domestic product of the country itself”. These policy frameworks emphasize the importance of adopting: a participative approach (e.g. including workers in the development of the intervention); a multidisciplinary approach (including organisational, technical and individual interventions); and interventions tailored to the workplace EASHW (2008:10) (EASHW, 2008:10).

5.2.1 Primary Interventions Focussed on Prevention

A systematic review by Aas *et al.* (2011) considered interventions designed to reduce the prevalence of neck-pain among workers, most of whom were office workers. They found no evidence to support the notion that work interventions could reduce the prevalence of severity of neck pain over any sustained period. However, Aas *et al.* (2009) note that this could reflect a lack of high quality RCTs or that work interventions were not well designed. Blasche *et al.* (2013) considered the importance of ergonomic features among frequent computer users. They found that Nordic walking

² NHS (2012) Health for Work Adviceline, <http://www.health4work.nhs.uk/blog/2012/02/work-related-musculoskeletal-disorders/>

³ HSE (2014) Musculoskeletal Disorders (MSDs) in Great Britain, <http://www.hse.gov.uk/Statistics/causdis/musculoskeletal/index.htm>

and ‘biofeedback’⁴ assisted relaxation and stretching led to short and medium term improvements in musculoskeletal complaints, although none had an effect on neuromuscular activity. Burger *et al.* (2012) undertook a novel approach involving stochastic resonance (whole body vibration) training in manufacturing workers. They found that the intervention was effective in the prevention of work-related musculoskeletal symptoms but not in the reduction of near-accidents. This approach had the advantage of requiring very little input in terms of infrastructure investments and time.

5.2.2 Secondary and tertiary interventions

Two reports review secondary and tertiary interventions for MSDs. Dibben *et al.* (2012:17) found that “most evidence seems to point toward the value of a multidisciplinary approach, including for example CBT [*cognitive behavioural therapy*] and workplace-focused interventions, including social support”. Dibben *et al.* (2012) also find that communication and coordination failure in larger companies can be obstacles to the effectiveness of interventions. Interestingly, they also highlight the link that some studies have found between MSDs and depression, suggesting that more holistic approaches to workplace health would be beneficial. In line with this, Breen *et al.* (2005) in their study conclude that when dealing with a variety of MSDs, interventions should emphasise the importance of worker empowerment, adequate pain control, information, reassurance, support and considerations for biopsychosocial rehabilitation.

Addley *et al.* (2010) conducted the only study in this area which focussed on the UK. They investigated the impact of direct access to a physiotherapy treatment service for 231 (participant) employees of the Northern Ireland Civil Service. The service was accessed by self-referral through line management, and included an initial assessment and up to 6 sessions with a physiotherapist. The results saw improvement in a work function score, a visual analogue scale for pain and an adjusted clinical score. Mortensen *et al.* (2014) analysed a long-term intervention of workplace strength training for the prevention of neck, shoulder and arm pain in Denmark. They conducted an RCT for 1 year, and followed up on the companies two years later. At the follow up, they found that the reduction in pain they recorded at the end of their supervised training was largely maintained. Loisel *et al.* (2007) tested the effectiveness of the authors’ Sherbrooke Model in 31 workplaces in Canada. The model advocates the use of progressive workplace and clinical intervention in order to address occupational back pain. Their results indicated that use of the Sherbrooke model sped up return to regular work by 2.4 times, and improved workers’ functional status. The model has also been tested successfully elsewhere (e.g. Anema *et al.*, 2007).

5.2.3 Interventions in the Construction Sector

Three papers (see Table A4.1 in Appendix 4) focussing solely on the construction sector and particular musculoskeletal disorders, disorders or injuries were identified. Cheng and Chan (2009) found that tailored training programs for manual workers resulted in a statistically significant decrease in the number of first-time reports of work-related musculoskeletal back injuries. Ludewig and Borstad (2003) and Borstad *et al.* (2009) both found promising results for home exercise interventions and job-specific training interventions at work. Both required minimal initial investment but appeared to reap sustained rewards.

⁴ A technique that uses monitoring instruments to measure and feed back

5.3 Health and Safety Practices

The Health and Safety Executive of Great Britain (HSE, 2013)⁵ reports that 1.1 million working people in Great Britain were suffering from a work-related illness in 2011/12, which together with injuries, resulted in the loss of 27 million working days. According to the HSE this not only creates significant costs for businesses, but was also estimated to lead to a social cost of £13.8 billion in 2010/11. These figures highlight the importance of workplace health and safety practice in the workplace.

One area in which the effectiveness of health and safety practice has been systematically investigated is that of occupational noise and associated hearing loss. Verbeek *et al.* (2012) conducted a systematic review of interventions to prevent occupational noise-induced hearing loss. They found that there is some, low-quality evidence to suggest that the implementation of stricter legislation may reduce noise levels at work. However, there were no controlled experiments testing effectiveness. However, hearing loss prevention programmes that focussed on training and proper use of hearing protection devices were effective in reducing the risk of hearing loss.

5.3.1 Health and Safety Interventions in the Construction Sector

The “Constructing Better Health” Final Evaluation Report from the Health and Safety Executive of Great Britain (Tyers *et al.*, 2007) provides evidence relating to the construction sector in the UK. This reports on a pilot programme conducted in Leicestershire. The programme involved numerous interventions. The most popular of these included site visits to discuss occupational health issues, voluntary health checks and toolbox talks. The main impacts were increased awareness of health issues and risks, improved personal health behaviours and the use of personal protective equipment. Counterintuitively, those companies who chose to participate were more likely to report accidents or worker absence compared with companies outside the scheme, although this could be explained by better reporting standards in these firms, or by the fact that they may have self-selected into the program because of existing health and safety issues.

A (reprinted) systematic review of 13 studies (including two from the UK) focused on the prevention of occupational injuries among construction workers (van der Molen *et al.*, 2012). The study found that while multifaceted safety campaigns and drug-free workplace programmes may reduce non-fatal injuries within companies (in the long term), there is no similar evidence that regionally-focussed regulations, safety campaigns or inspections are effective. A similar review by Rivara and Thompson (2000) also found scant evidence that regulation and educational efforts could reduce falls in the construction industry. However, most of the studies reviewed were conducted in countries other than the UK, and therefore do not necessarily reflect on the impact of policy or regulations in Britain. The findings of these two studies are also in direct contrast with a study examining the impact of legislation change in Australia. The change in question required all workers in construction to complete mandatory safety awareness training before starting work. Bahn and Barratt-Pugh (2012) found that while industry reactions were initially negative, 3 years on 79% of respondents identified measurable benefits from employees having to complete the training, and 96% reported that the training resulted in lower incidences of work-related injury.

Two doctoral theses are included in this review. The first, Hallowell (2008) describes a formal model for construction safety and found that the most effective safety programme elements could be categorized by 4 tiers, the two top tiers included: Upper management support and commitment; employee involvement in safety management training, job hazard analyses, regular safety meetings, frequent worksite inspections and; a site-specific safety manager. The second thesis (Darragh, 2001) analysed the impacts of an intervention to improve safety practices amongst residential construction workers. The ‘HomeSafe Pilot Programme’ involved a 3 hour safety training and programme

⁵ HSE (2013) The Health and Safety Executive Statistics 2012/13 <http://www.hse.gov.uk/statistics/overall/hssh1213.pdf>

orientation class, provision of reading material (in the form of a guide booklet), and access to optional 10 hour, tailored construction courses. Injury rates declined following the intervention, however this decline was found to be statistically insignificant once temporal variation was controlled for. There were, on the other hand, positive effects among specific trade groups, especially in relation to severe injuries.

Seixas *et al.* (2011) examined hearing protection device usage in construction workers. Their intervention was an RCT that, at baseline, included hearing loss prevention training. Treatment groups were then given follow-up reinforcement training and the use of a personal noise level indicator. In all cases protection device usage increased, but the increase for the treatment groups was statistically the largest. Harrington *et al.* (2009) focused on the use of 'tailgate training sessions': brief job site safety meetings at the start of work. They found that many supervisors were incorrectly trained to deliver these tailgate sessions. However, while 86% of participants found the training program useful, there is no hard evidence of a reduction in injuries. Bena *et al.* (2009) had a similar focus on an on-site training program to reduce injury (in Italy). They found a reduction in occupational injuries following the baseline training module, and this reduction increased as specific training modules were completed.

As a final point on general health and safety in the construction sector, a recent McGraw-Hill Construction Study (2013) suggested that the most important elements for improving safety practices on construction sites were the following: (i) developing a site- and job-specific health and safety plan; (ii) analysing potential safety hazards before work begins; and (iii) appointing, assigning or authorizing project safety personnel before construction begins on site.

5.4 Summary

The evidence base suggests that there is a great deal of industry and job specific diversity in relation to the types of interventions that are required. This implies a need for MSD, and health and safety work interventions to be tailored to the environment and the type of risks employees face in their regular work. There is also a need for inclusive, holistic and sustained interventions in relation to MSD prevention and support. However, effective interventions need not be exorbitantly costly: an initial costly investment may be required, but it is often sustained support and education that ensures program success and thus the initial fixed costs can be spread over a longer duration. Thus, while most papers do not explicitly discuss the economic cost-benefit analysis of interventions the evidence that is available suggests that, in general, the benefits of interventions can far outweigh the costs.

6. Conclusions and recommendations for future research

The primary purpose of this scoping review was to summarise the ‘extent, range and nature’ of research evidence on workplace health and wellbeing interventions. As such the review aims to be useful as a mechanism for disseminating the research findings to the business community, practitioners and policy makers (Antman et al. 1992).

This report has considered health and wellbeing interventions in the work place categorized according to their focus on: (i) mental health and wellbeing (ii) reduced health risks through participation in physical activity, improved nutrition and smoking cessation and (iii) musculoskeletal disorder and health and safety. An extensive literature search resulted in a review of a diverse set of studies in these three broad areas.

A concern with health and wellbeing in the work place is of paramount importance to individuals, businesses and society at large. The workplace is where people in employment spend half of their waking hours, and the workplace community is one to which most adults belong. A healthy working population is not only an ethical priority for businesses, but also benefits business materially through increased productivity and reduced costs linked to injuries and illness including costs relating to presenteeism and sickness absence. There are also wider costs to society of ill-health reflected in the priority given to health policy. In this review we conducted additional searches for the construction and retail sectors. These industry sectors tend to have high labour turnover linked to job insecurity, and in the case of construction, high accident and injury rates.

“[W]hen WHP [*workplace health promotion*] programs are grounded in behaviour theory, implemented effectively ensuing evidence-based principles, and measured accurately, they are more likely to improve workers’ health and performance. These results can contribute to the organisation’s competitiveness and potentially enhance the organisation’s standing in the community. However, we need to learn more about the mechanisms and processes that facilitate behaviour change among workers, as well as those that are ineffective”.

Goetzel and Ozminkowski (2006: 310)

Goetzel and Pronk (2010) along with many other papers discussed in this report, suggest that multi-component health interventions are the most effective in inducing long term change in working environments and worker’s lifestyles. Other implications of the evidence reviewed include the following:

- Identifying high-risk individuals, and developing tailored interventions increases success rates;
- A participative approach to intervention development is beneficial and
- Sustained interventions over the long term are most effective.⁶
- Interventions that target organisational cultures and practices, the work environment as well as the individual’s behaviour, have produced more effectual interventions.

⁶ Such sustained intervention can be of low economic cost to business, taking the form of a ‘maintenance’ intervention.

One of the most important conclusions that can be drawn from this review is that it is important to conceptualise the wellbeing of workers holistically in order to allow for the interconnections between work-related and non-work-related influences and impacts. Links between mental health illness and dietary and physical activity behaviours are well-known, and recent studies have indicated there might also be a link between depression and musculoskeletal disorders (Dibben *et al.*, 2012). This suggests that interventions should build in multidimensional outcomes (physical and mental) as well as incorporate multiple levels and components. However, as highlighted in the quote above from Goetzel and Ozminkowski (2006: 310), more research is needed to ascertain optimal ways of combining and operationalising components when developing multi-component interventions. Future research should also focus on determining appropriate multi-component interventions that have a long-term impact. Targeting individual behaviour may also require interventions to expand their remit beyond the workplace to include commuting and lifestyles more generally. This point is emphasised by Hymel *et al.* (2011) and Shain and Kramer (2004).

By placing boundaries around these activities (creating workplace 'silos') their overall effectiveness has been limited"

- Hymel *et al.* (2011: 695)

"[T]he physical and psychosocial aspects of the working environment (organisation or work) can influence the abilities of individuals to care for their own wellbeing and to maintain their own 'personal resources'. Personal resources would include an individual's sense of efficacy, their resilience and 'hardiness', and the quality and density of the social support they believe is available to them. Those personal resources are affected by both work and non-work factors...health promotion programmes will only be effective in enhancing the health status of the workforce when the interventions attend to both individual and environmental influences"

Shain and Kramer (2004:643)

Furthermore, there is a need for more systematic evaluation and cost-benefit analyses in order to inform businesses when and where there is a real economic benefit from making investments that improve their employees' health and well-being. There also needs to be research undertaken to identify low-cost interventions that are more affordable and more practical for small-to-medium sized businesses. The report shows that a wide range of individual and organisation outcomes have been investigated. However some of the outcomes are not clearly defined leading to questionable methods of evaluation and interpretation of findings. Outcomes range from change in knowledge, behaviour, job satisfaction, supporting individuals with health conditions to remain at work or to return to work following absence, reducing societal costs of sickness absence and incapacity for work. With this variety in outcomes it is difficult to compare the relative effectiveness of different interventions.

"[M]any employers are reluctant to offer sufficiently intensive and comprehensive work site programs because they are not convinced that these programs deliver on the promise that they can reduce risk factors for their employees and achieve a positive financial return on investment"

-Goetzel and Ozminkowski (2006: 305).

Wider social and economic concerns with health and wellbeing, led by governmental and non-governmental agencies around the world, has seen an increase in research on workplace interventions. However, more high-quality research is still needed to inform policy and practice in the UK and elsewhere. The UK benefits from a nationalised health care system with universal access. This brings with it many advantages, as interventions can be developed that make use of the resources made available through the state. On the other hand, the public health system removes some of the private economic incentives for employees to initiate interventions. This is because some of the costs of employee illness are borne by society rather than by the firm e.g. costs linked to private medical insurance charges paid by firms in the US. This suggests that there is a need for further research based specifically on the UK experience, as there are risks in simply adopting successful programs from other countries that have different cultural, business and policy environments. For example, there are potentially differential impacts linked to superdiversity in the workforce. This is likely to be particularly relevant in sectors where migrant workers constitute a large percentage of the workforce as in agriculture, construction trades and services. Migrant workers in particular may be particularly vulnerable to mental health risks given distance from family and friends and relatedly, less well developed social support networks. Overall, there is a need for more research located in sectors such as construction and retail where previous research identifies particular risks.

Two key methodological insights for future research have been drawn from this review. Firstly, before developing an intervention it is imperative to understand the characteristics of the organisation, their work practices, the work environment, policies and the workforce (health status, perception, belief, fitness to carry out job tasks etc.). Without this information it will be difficult to interpret the findings and to compare results from studies investigating similar interventions. A second methodological insight is that interventions should adopt a holistic approach with clearly defined outcomes and methods for evaluation of intervention at different stages – participation, compliance and sustainability of outputs. A holistic approach in this context refers to the use of different measures (exercise, diet, health) as well as considering both work-related and non-occupational factors and stressors. This is important since while all the studies cited in the report are developed/implemented at the work place the risk factors for health and wellbeing are likely to be combination of lifestyle factors (non-occupational) as well as work-related factors e.g. work load, work organisation etc. Studies (interventions) can be designed to address these individually or more commonly both together as they are difficult to differentiate. For example the Sherbrooke model (p.29) provides a stepwise intervention with clearly defined outcomes for individuals who have been absent from work. For these reasons it is important that intervention studies define outcomes clearly and provide a mechanism/model by which the outcomes can be achieved.

Together these methodological insights imply that there is a requirement for well-defined conceptual models before initiating intervention projects. However, a major gap seems to be the development of appropriate methodologies for designing and evaluating interventions. Nevertheless, the literature base reviewed here demonstrates that these methods should be based on a detailed understanding of the characteristics of the individuals (demographics, socioeconomics), the workplace (size, cultures, resources, support mechanisms) and the sector type (nature of hazards and risk, staff multiple employers, sub-contractors). All are likely to have a role in determining the health and wellbeing of individuals both in and outside the workplace.

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Appendix 1: Main search terms

- “workplace” & “wellbeing” or “well-being” & “intervention” & “mental health”
- “wellbeing” & “workplace” & “intervention” & “mental health”
- “workplace” & “wellbeing” or “well-being” or “mental health” or “retail”
- “workplace” & “mental health” & “retail” or “construction”
- “workplace” & “health promotion” & “wellbeing” & “construction”
- “workplace” & “health promotion” & “wellbeing” & “retail”
- “workplace” & “health promotion” & “wellbeing” & “mental health” & “construction”
- “workplace” & “health promotion” & “wellbeing” & “mental health” & “retail”

Appendix 2

Table A2.1: A systems approach to job stress: protecting and promoting mental health in the workplace using primary, secondary and tertiary interventions

Relative effectiveness	Intervention level	OH&S: hierarchy of controls	Psychology and related disciplines	Examples of intervention objectives and corresponding activities	
				Objectives	Activities
MOST	PRIMARY GOAL: To eliminate or reduce job stressors (eliminate or reduce risk factors for job stress)	Control at the source of the hazard or interception of the hazard in its path from source to worker through: <ul style="list-style-type: none"> Hazard elimination Substitution with safer technology Process isolation to contain exposure Engineering controls to reduce exposure 	Organisational psychology: Address stressors at the level of the organisation, or work-directed intervention	Reduce job demands	Increase time or other resource allocations to complete specific tasks. Redesign the physical work environment to reduce musculoskeletal load and noise. Provide breaks from client-based work.
				Improve job control	Increase worker participation in work planning and decision-making. Assess and integrate employee needs into planning of work schedules.
				Improve social support	Assess and integrate employee needs to optimise supervisory social support. Create clear promotion pathways.
	SECONDARY GOAL: To alter the ways that individuals perceive or respond to stressors	Control at the worker level through: <ul style="list-style-type: none"> Administrative controls (e.g. job rotation) Training and education Personal protective equipment Health surveillance 	Psychology: Organisation-directed interventions, particularly around the org-individual interface, and individual-directed interventions	Alter individual responses to job stressors	Provide cognitive behavioural therapy or relaxation response training
				Improve individual ability to cope with short-term stress responses	Provide anger management training
				Detect stress-related symptoms and intervene early	Conduct health screening for stress symptoms, ambulatory blood pressure, hypertension – assess results on work group level
LEAST	TERTIARY GOAL: To treat, compensate, and rehabilitate workers with job stress-related illness	Control at the level of illness through: <ul style="list-style-type: none"> Treatment Workers' compensation Rehabilitation and return-to-work programs 	Psychology, psychiatry: counselling and psychotherapy	Treat job stress-related illness	Medical care, counselling and employee assistance programs
				Compensate job stress-related illness	Reduce adversarial aspects of compensation process
				Rehabilitate job stress affected workers	Include modification of job stressors in return-to-work plans

Source: (LaMontagne, et al., 2007: 223).

Table A2.2: Evidence source for reasons for introducing workplace wellbeing schemes

Reasons for introducing workplace wellbeing schemes	Evidence source - Author and country
Organisational infrastructure reduces cost and makes it easier to develop and co-ordinate programs	(Martin <i>et al.</i> , 2009) (Chu <i>et al.</i> , 1997)
Having a large 'captive' population or easily accessible target group	(Addley <i>et al.</i> , 2014 - UK) (Du Plessis <i>et al.</i> , 2013) (Martin <i>et al.</i> , 2009 - Australia) (Engbers <i>et al.</i> , 2005) (Chu <i>et al.</i> , 1997 - Australia)
Health gap and inequality between 'blue collar' and 'white collar' workers	(Chu <i>et al.</i> , 1997 - Australia)
Human rights and justice issues including the need to address workplace wellbeing if: (1) mental disorders decrease the proportion of the population who are not in the labour force, (2) mental disorders decrease the employment opportunities for people who would like to work, or (3) mental disorders affect the ability of workers to do their jobs (Dewa and McDaid, 2011: 35)	(Dewa and McDaid, 2011 - Canada)
Economic arguments including decreased productivity or work performance; reduction of persons in the labour force through absenteeism or unemployment or early retirement; elevated indirect costs through sickness and disability	(Addley <i>et al.</i> , 2014 - UK) (Dewa and McDaid, 2011 - Canada) (Knapp <i>et al.</i> , 2011 - UK) (Martin <i>et al.</i> , 2009 - Australia) (Dewa <i>et al.</i> , 2004) (Kirk and Brown, 2003 - Australia) (Sparks <i>et al.</i> , 2001 - UK) (Danna and Griffin, 1999 - USA)
Compensable disorders/lawsuits or risk and safety issues	(Martin <i>et al.</i> , 2009 - Australia) (Danna and Griffin, 1999 - USA)
Increased employee morale/job satisfaction/better corporate image	(Kirk and Brown, 2003 - Australia) (Sparks <i>et al.</i> , 2001 - UK)
Increased vulnerability to mental health problems without support	(Knapp <i>et al.</i> , 2011 - UK) (Martin <i>et al.</i> , 2009 - Australia) (Stansfeld and Candy, 2006 - UK) (Faragher <i>et al.</i> , 2005 - UK) (Cotton and Hart, 2003 - Australia)
Spillover effects on co-workers and supervisors and/or families	(Dewa and McDaid, 2011 - Canada) (Knapp <i>et al.</i> , 2011 - UK) (Faragher <i>et al.</i> , 2005 - UK)
Insurance and health related direct costs to employers (US; Canada – this is often related to the structure of the health care system)	(Danna and Griffin, 1999 - USA)

Appendix 3: Evidence relating to nutrition, physical activity and smoking cessation in the workplace.

A3.1 Nutrition and physical activity: Individual level interventions

Article	Objective	Subjects	Intervention	Methods and measures	Outcomes	Country
(Carnie et al., 2013)	To investigate whether nutrition education sessions at the work place added to internet-based wellness information and exercise resources would facilitate weight and fat mass loss in a racially diverse population of overweight female employees	199 non diabetic women	A 6-month program of either internet-based wellness information (WI) combined with dietitian-led nutrition education group sessions (GS) weekly for 3 months	Adiposity: BMI Weight Fat mass Truncal Fat Abdominal circumference Hip circumference Exercise performance: Peak VO2 Insuline sensitivity Total cholesterol LDL-cholesterol HDL-cholesterol Triglycerides	Overweight women provided with internet-based wellness information and exercise resources at the work site lost weight and fat mass, with similar achievement by black and white women.	US
(Cash et al., 2012)	To assess the effect that dietary and physical activity behaviours have on QoL measures	Participants were 747 employees (blue collar)	No specified	self-reported servings of fruits and vegetables, dietary behaviors such as fast food consumption, Godin freetime physical activity scores, measured height and weight, Obesity and Weight Loss Quality of Life (OWLQOL) scores, and Work Limitations Questionnaire (WLQ) scores	Physical activity was positively associated with OWLQOL only in women.	US
(Dubuy et al., 2013)	To evaluate the dissemination efforts of the program and to gain insights in whether free	Data were collected at the individual (i.e. employees) and the organizational	The RE-AIM framework was used to guide the evaluation	the intervention consisted of three major components: (1) two cycling contests, (2) an	At the individual level, a project awareness of 65% was found. Employees aware of the	Belgium

	participation could persuade small and middle-sized companies to sign up.	(companies) level. After two mailings a total of 1116 respondents (23%) completed the questionnaire		online loyalty program based on earning 'cycling points' and (3) the dissemination of information	program had a significantly more positive attitude towards cycling and reported significantly more commuter cycling than those unaware of the program	
(Gram et al., 2012)	To assess the physical capacity of construction workers and evaluate the effect of individually tailored exercise programs on their physical fitness and muscular capacity.	Construction workers	The intervention lasted 12 weeks, and the exercise group trained 3 × 20 minutes a week.	The primary outcome variables were VO2max and isometric muscle strength. Secondary outcomes were body mass index (BMI), fat per cent, blood pressure, and blood lipid profile.	Training for 20 minutes, 3 times a week significantly increased VO2max with a clinically relevant magnitude regarding risk of cardio-metabolic disorders. Good effectiveness for integrating short exercise bouts into organizational routines among constructions workers.	Denmark
(Ferdowsian et al., 2010)	To evaluate the effectiveness of addressing multiple barriers to physical activity (PA) using interventions at the workplace.	113 participant, employee of government and insurance companies	Departments were randomly assigned to (1) control, (2) gym membership, (3) gym + PA education, (4) gym + time during the workday, and (5) gym + education + time.	PA intensity and quantity were measured using the 7-day Physical Activity Recall instrument, with PA then classified as the number of days meeting Centers for Disease Control and Prevention guidelines	Among sedentary adults who had access to indoor exercise facilities, addressing environmental and cognitive barriers simultaneously (i.e., time and education) did not encourage more activity than addressing either barrier alone	US

(Reijonsaari et al., 2009)	To evaluate the effectiveness of lifestyle counselling on the level of physical activity in an occupational health setting.	1100 eligible employees of a Finnish insurance company	Lifestyle modification and takes 12 months	The outcomes will be measured by questionnaires at baseline, after 6, 12, and 24 months, and sickness absence will be obtained from the employer's registers.	No reported	Finland
(Gazmararian et al., 2013)	To determine whether a multicomponent nutrition intervention program at a corporate site reduces body weight and improves other cardiovascular risk factors in overweight individuals.	410 participants, University non faculty employers	A 22-week intervention including a low-fat, vegan diet.	Changes in body weight, anthropometric measures, blood pressure, lipid profile, and dietary intake	Among individuals volunteering for a 22-week worksite research study, an intervention using a low-fat, vegan diet effectively reduced body weight and waist circumference.	US
(Groeneveld et al., 2011)	To evaluate the effects on physical activity (PA), diet, and smoking of a lifestyle intervention consisting of individual counselling among male workers in the construction industry with an elevated risk of cardiovascular disease (CVD).	162 blue- and white-collar workers (82 in Control Group)	Individual counselling using motivational interviewing techniques, and was delivered by an occupational physician or occupational nurse. Participants chose to aim at either diet and PA, or smoking	Data were collected at baseline and after six and 12 months, by means of a questionnaire	The intervention had a statistically significant beneficial effect on snack intake (β -1.9, 95%CI -3.7; -0.02) and fruit intake (β 1.7, 95%CI 0.6; 2.9) at 6 months. The effect on snack intake was sustained until 12 months; 6 months after the intervention had ended (β -1.9, 95%CI -3.6; -0.2)	US
(Holdsworth, 2004)	to assess whether the implementation of the HBA scheme in the workplace results in an improvement in eating habits at work.	577 employees Type of work: one service industry, one psychiatric hospital, one community hospital and one head office of a food manufacturer	Implementation of the hearth beat award scheme. Longitudinal questionnaire (before and after the implementation).	Dietary changes of consumption of 20 food item	Significantly positive change in intervention workplaces only for four of the 20 food items tested: increase in consumption of fruit; reduction in	UK

		(treatment), one shoe manufacturer and one retailer/department store (control)			consumption of fried foods and sweet puddings and fat milks.	
(Kettunen et al., 2014)	To assess the effects of a 12-month physical exercise intervention on work ability (WAI) and cardiorespiratory fitness (CRF) in healthy working adults.	371 participants, of which 338 (212 women and 126 men) were allocated in the exercise group and 33 (17 women and 16 men) in the control group.	The exercise group underwent a 12-month exercise program followed by a 12-month follow-up.	Work ability and cardiorespiratory fitness were evaluated at baseline, and at 4, 8, 12, and 24 study months, in both exercise and control groups	The subgroup that benefitted the most from the exercise intervention was the group that had the lowest WAI at baseline	US
(Korshøj et al., 2012)	To evaluate the effect of the worksite aerobic exercise intervention on cardiorespiratory fitness and cardiovascular risk factors among cleaners.	Cleaning in day-care institutions, offices, hospitals and schools	The intervention group will be offered supervised aerobic exercise of 60 minutes duration split into 2–3 weekly sessions during the first phase of the intervention.	At baseline, four and 12 months after baseline. The data collection will consist of a health check consisting of a questionnaire-based interview, physical testing of health and capacity-related measures, and objective diurnal measures of heart rate, physical activity, body position and blood pressure.	No outcomes reported	Denmark
(Leslie et al., 2002)	To compare the effectiveness a 2512 kJ (600 kcal) daily energy deficit diet (ED) with a 6279 kJ (1500 kcal) generalized low-calorie diet (GLC) over a 24 week period (12 weeks weight loss plus 12 weeks weight maintenance).	One-hundred and twenty-two men aged between 18 and 55 years	Eligible volunteers were randomized to one of the four diet=meat combinations (ED meat, ED no meat, GLC meat, GLC no meat). One-third of subjects in each diet=meat combination were randomized to an initial control period prior to receiving dietary advice.	Physical/anthropometric measurement (height, weight, waist circumference and fasting plasma lipids). Dietary targets monitor(food frequency questionnaire)	This study has shown that the 2512 kJ (600 kcal) ED individualized approach was no more effective in terms of weight loss than a blanket 6279 kJ (1500 kcal) approach with a large prescribed energy deficit.	UK
(McEachan et al., 2008)	to explore the impact and cost-effectiveness of a	1260 participants from 44 UK worksites (based	An easy to implement toolkit, delivered in-house	Moderate - Vigorous MET minutes of Physical	no significant effect of the intervention on MET	UK

	workplace physical activity intervention designed to increase physical activity levels	within 5 organizations)	by trained local facilitators (volunteer employees with no specialist skills or knowledge) over a three-month period.	Activity	minutes of activity (from the IPAQ) at any of the follow-up time points controlling for Significantly reduce systolic blood pressure and resting heart rate and significantly increased body mass index compared to control. The intervention was found not to be cost-effective	
(Robroek et al., 2012)	To evaluate the cost-effectiveness of a long-term workplace health promotion programme on physical activity (PA) and nutrition.	924 participants	The intervention was compared with a standard programme consisting of a physical health check with face-to-face advice and personal feedback on a website.	No statistically significant differences were found on primary and secondary outcomes, nor on costs	Primary outcomes were meeting the guidelines for PA and fruit and vegetable intake. Secondary outcomes were self-perceived health, obesity, elevated blood pressure, elevated cholesterol level and maximum oxygen uptake.	
(Sjøgaard et al., 2014)	To present a study protocol with a conceptual model for planning the optimal individually tailored physical exercise training for each worker based on individual health check, existing guidelines and state of the art sports science training recommendations in the broad categories of	No reported	Individually tailored programs termed "Intelligent Physical Exercise Training", IPET. 1) to balance the physiological capacity of the employees relative to occupational exposure, 2) to tailor the exercise to individual capacities and disorders to improve employees' health, 3) to motivate participants by	Estimated maximal oxygen uptake BMI and body fat Balance test Blood pressure Blood profile Questionnaire Company registered data	No reported	

	cardiorespiratory fitness, muscle strength in specific body parts, and functional training including balance training		offering evidenced and enjoyable programs implemented with care, and 4) to be cost-effective for the company.			
Nilsson et al. (2001)	To investigate the effects of a long-term comprehensive program of life-style intervention to prevent cardiovascular disease.	128 public sector employees (Sweden)	Self-reported smoking cessation via questionnaire at 12 and 18 months	18-month, life-style intervention programme 16 group sessions and individual counselling (off-site but during work hours)	Statistically significant reduction in smoking habits from 65% to 37% (at 12 months) and 40% (at 18 months) (No change in control)	Sweden
Prior et al. (2005)	To assess the impact of a multicomponent worksite health promotion program for reducing cardiovascular risk factors (CVRF) with short intervention, adjusting for regression towards the mean (RTM) affecting such nonexperimental study without control group.	839 workers in 74 companies (Various countries in Europe)	Self-reported smoking cessation via questionnaire at 3.7 years (on average)	One 15 minute screening followed by a counselling session with 2 health educators	Quit rate of 5.5% per year, but in line with natural trend of 3-5% Number of cigarettes smoked decreased. Almost 5% of non-smokers started to smoke	Switzerland
(Naito et al., 2008)	To assess the effect of a work place based intervention program on the blood lipid profiles of participating employees as part of a population strategy for promoting long-term increases in physical activity.	2929 participants	a large-scale controlled trial of interventions to decrease cardiovascular risk factors, during which we assessed the effect of a workplace-based intervention program, which was part of a population strategy for promoting long-term increases in physical activity, on the blood lipid profiles of participating employees	Biologic data were collected during annual health examinations, and included blood pressure measurements and serum total lipid and HDL-C levels	Our results show that an intervention program promoting physical activity raises serum HDL-cholesterol levels of middle-aged employees. Increased awareness of the benefits of physical activity, using environmental rearrangement and health promotion campaigns, which especially target walking, may have contributed to	Several

					a beneficial change in serum HDL-cholesterol levels in the participants.	
(Thomas and Williams, 2006)	To describe the implementation and outcomes of a pedometer-based workplace physical activity (PA) promotion program conducted with volunteer staff from the former Department of Human Services in South Australia.	Staff from the former department of human services	Staff were supported to increase activity through wearing a pedometer and encouraged to aim for 10,000 steps per day.	Number of daily steps	Simple programs to promote PA that incorporate usual daily activity can be popular and effective at improving understanding of the importance of PA and increasing activity.	Australia
(Thorp et al., 2012)	To examine sedentary time, prolonged sedentary bouts and physical activity in Australian employees from different workplace settings, within work and non-work contexts	A convenience sample of 193 employees working in offices (131), call centres (36) and customer service (26) was recruited.	A uniaxial accelerometer was distributed to participants on day one and collected on day eight. The accelerometer was placed at the waist and secured by an elastic strap along the right anterior axillary line, and participants were requested to wear the accelerometer during all waking hours, except during water-based activities.	Actigraph GT1M accelerometers were used to derive percentages of time spent sedentary (<100 counts per minute; cpm), in prolonged sedentary bouts (≥20 minutes or ≥30 minutes), light-intensity activity (100–1951 cpm) and moderate-to-vigorous physical activity (MVPA; ≥1952 cpm)	Working hours were mostly spent sedentary (77.0%, 95%CI: 76.3, 77.6), with approximately half of this time accumulated in prolonged bouts of 20 minutes or more. There were significant (p<0.05) differences in all outcomes between workdays and non-work days, and, on workdays, between work- versus non-work hours.	US

A3.2 Nutrition and physical activity: Environmental level interventions

Article	Objective	Subjects	Intervention	Methods and measures	Outcomes	Country
(Graham et al., 2013)	To assess 2-year effectiveness of an environmental intervention	six recruited worksites	Intervention modifications were signs encouraging stair use, music, and	Stair use objectively via infrared beam counters placed on the ground floors in stairwells at each worksite self-reported stair	Positive impact of environmental modifications on stair use persist over a longer time period. Infrequent stair users may be	US

	promoting worksite stair use.		art posters in stairwells.	use subjectively by means of a questionnaire item which read "In the last month, how frequently did you use the stairs at work?"	most amenable to the behaviour changes encouraged by these environmental enhancements	
(Beresford et al., 2007)	To create a behavioural intervention program to maintain or reduce weight through healthy eating and physical activity		The intervention used an ecological framework modified by qualitative methods that identified salient barriers and facilitators of behavioural change.	Dietary behaviour was assessed, not by calories, but by behavioural measures related to BMI. Physical activity behaviours were surveyed. BMI is derived from reported height and weight at baseline	After adjusting for age, gender, race, and education, BMI was associated with frequency of intensity-adjusted physical activity, sweat-inducing exercise, fast food meals, soft drinks, eating while doing another activity, and fruit and vegetable intake	
(DeJoy et al., 2012)	To design a process evaluation that would allow us to assess the quality of implementation of the environmental interventions deployed in this study and to corroborate these mostly objective data with other data collected through interviews and surveys of key informants within the organization.	large manufacturing organization	A different number of interventions were designed (see table 1 article)	Employee survey EAT score	Environmental assessments showed improvements in workplace supports for weight management and significant differences by treatment level. Positive shifts in health climate perceptions also occurred, but sites receiving the intense treatment were not perceived as more supportive by employees	US

A3.3 Smoking Cessation Interventions

Article	Objective	Subjects	Intervention	Methods and measures	Outcomes	Country
Nilsson et al.	Prevention of	128 public	18-month, life-style	Self-reported smoking	Statistically significant reduction in	Sweden

(2001)	cardiovascular disease	sector employees	intervention programme 16 group sessions and individual counselling (off-site but during work hours) (Control: Standard written and oral advice)	cessation via questionnaire at 12 and 18 months	smoking habits from 65% to 37% (12 months) and 40% (18 months) (No change in control)	
Prior et al. (2005)	Reduction in cardiovascular risk factors	839 workers in 74 companies	One 15 minute screening followed by a counselling session with 2 health educators	Self-reported smoking cessation via questionnaire at 3.7 years (on average)	Quit rate of 5.5% per year, but in line with natural trend of 3-5% Number of cigarettes smoked decreased Almost 5% of nonsmokers started to smoke	Various countries in Europe
<i>Smoking Cessation Interventions in the Construction Sector</i>						
Groeneveld et al. (2011)	Reduction of the risk of cardiovascular disease by improving lifestyle behaviours	162 blue- and white-collar workers (82 in Control Group)	6 month lifestyle intervention: individual counselling by occupational physician or nurse (3 face to face, 4 telephonic contacts) One-to-one motivational interviewing counselling sessions by telephone with a health advisor	Self-reported smoking cessation via questionnaire after 6 and 12 months	Statistically significant reduction in smokers at 6 months, but not at 12.	The Netherlands
Sorensen et al. (2007)	Promote smoking cessation and increased fruit and	582 blue-collar workers	A mailed tailored feedback report Written	Self-reported lack of smoking in the previous 7 days, via questionnaire after 6 months	Control group: 8% of baseline smokers quit	US and Canada

	vegetable intake for high risk workers who change job sites frequently		educational materials mailed across the intervention period 6 telephone calls in 3 months		Intervention group: 19% of baseline smokers quit	
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Appendix 4: Evidence Relating to Musculoskeletal disorder and Health and Safety in the workplace.

A4.1 Musculoskeletal Disorder Interventions in the workplace

Article	Objective	Subjects	Intervention	Methods and measures	Outcomes	Country
Blasche et al. (2013)	Prevention of musculoskeletal complaints in frequent computer users	93 employees	1) Nordic Walking 2) Biofeedback assisted relaxation and stretching 3) Balance exercises	Self-reported musculoskeletal complaints Neuromuscular activity in neck/shoulder region	NW and Biofeedback interventions were successful in reducing complaints in the short and medium term. No intervention had effects on neuromuscular activity.	The Netherlands
Burger et al. (2012)	Prevention of work-related musculoskeletal symptoms	38 white and blue-collar workers in manufacturing	Four weeks of exercise using stochastic resonance training	Daily questionnaires on musculoskeletal pain, related function limitations and musculoskeletal well-being	All three components showed positive results, with the latter two's effect being linear over time.	Switzerland
Mortensen et al. (2014)	Investigate long-term effects and implementation processes of workplace strength training for musculoskeletal disorders	573 laboratory technicians	High intensity strength training in 1 year randomized control trial, thereafter continued by firms unmonitored. (During work hours, long-term basis)	Questionnaire at 3 year follow up concerning pain reduction in neck, shoulder, elbow, and wrist	Reduction in all forms of pain listed, achieved during year 1, were largely maintained after 3 years.	The Netherlands
<i>Musculoskeletal Disorder Interventions in the Construction Sector</i>						
Ludewig and Borstad (2003)	Reducing symptoms and improving function in construction workers with shoulder pain	67 construction workers with symptoms of shoulder pain and impingement (Control group: 33)	Instructed in standardized eight week home exercise programme: 5 shoulder stretching and strengthening exercises	Follow-up testing after 8-12 weeks: Shoulder rating questionnaire score and shoulder satisfaction score	Intervention subjects had lower average questionnaire scores and reported significantly greater reductions in pain and disability	USA
Borstad et al. (2009)	Prevention of the onset of shoulder	240 construction apprentices	Home exercise programme	Shoulder pain onset over 2 years	The proportion of new-onset shoulder pain in the control	USA

	pain in construction workers		(protective and preventative in nature)		group was higher than in the exercise group	
Cheng and Chan (2009)	Prevention of work-related musculoskeletal back injuries	205 construction workers	Intervention and control: half day training workshop. Intervention: Hierarchical task analysis conducted before the workshop, allowing for a more tailored, job-specific programme	Knowledge and practical skills on manual material handling after training, first time reports of work-related MSD back-injuries after 1 year	Positive group difference in knowledge and skills, Fewer cumulative number of first-time back injuries in intervention group after 1 year.	Hong Kong

A4.2 Health and Safety Interventions in the Construction Sector

Article	Objective	Subjects	Intervention	Methods and measures	Outcomes	Country
Seixas et al. (2011)	Increase Hearing Protection Device usage among construction workers	176 subjects on 8 sites	3 pronged: Baseline – hearing loss prevention training; Follow-up toolbox reinforcement training (TB) Use of a personal noise level indicator (NLI)	Increased Hearing Protection Device (HPD) usage after intervention and 2 months later	Usage increased by 12.1% post intervention and 7.5% two months after completion. Those who received TB and NLI interventions were two times more likely to use HPDs	USA
Harrington et al. (2008)	Promote hazard awareness and safe work practices	1525 participants	25 4 hour “training of trainers” sessions	Questionnaire on training session usefulness	86% found training useful. The most important aspects were reported to be: (i) how to conduct a tailgate training (ii)resources provided (iii) regulations discussed; and (iv) importance of employee involvement in tailgates	USA

Bena et al. (2009)	Reduce injury rates at a major railway construction project	2795 participants	A training program to raise workers' awareness of risks, and provide them with the skills to prevent and control those risks	Injury rates over a 4 year period from 2002 to 2006	The incidence of occupational injuries had fallen by 16% after the basic training module and by 25% following the specific modules	Italy